

Catalog L S-D

Dunco Relays



STRUTHERS-DUNN

5,348 RELAY TYPES

STRUTHERS-DUNN INCORPORATED, Pitman, New Jersey, U. S. A.

SELECTING RELAYS

IDENTIFYING RELAYS WHEN ORDERING

Three items completely identify most relays:

1. Struthers-Dunn type designation.
2. Coil voltage and frequency (or D.C.)
3. Contact rating desired.

Special operating or environmental requirements should be included when applicable.

STANDARD RELAYS

Relays built in accordance with the "General Specifications" listed on this page are considered standard when furnished with terminals for front connection. No covers, housings or auxiliary equipment are included.

CONTACT ARRANGEMENT

Nine fundamental contact arrangements are available as shown in the following diagrams.

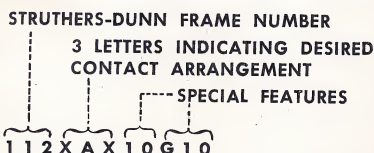
Type Contact	Normally-Open	Double-Throw	Normally-Closed
Single-Break			
Double-Break			
Double-Break with Pigtail			

SINGLE-POLE CONTACTS

Double-break contacts with or without pigtail, are normally used only on single-pole relays. Contacts are considered in their "normal" position when the relay coil has not been energized.

S-D TYPE DESIGNATIONS

Struthers-Dunn relays are clearly identified by an easily understood type designation method as follows:



Basically, the Struthers-Dunn frame number identifies the relay size and construction. An original S-D relay design has only a numerical frame number designation i.e. 112XAX10G10. A revision of this original design would carry a prefix letter i.e. A112XAX10G10. These frame numbers are included in the catalog listings of the various relay types.

Three letters following the frame number identify the contact arrangement.

The first letter indicates the *normally-open* contacts.

The second letter indicates the *double-throw* contacts, and the third the *normally-closed* contacts.

"X's" are used as "blanks" when no contacts of a particular type are wanted. Contact arrangement letters are selected from the following table to indicate the desired number of contacts of each type:

No. of Contacts	Single Break	Double Break	D.B. with Pigtail
0	X	X	X
1	A	H	M
2	B	J	N
3	C	K	P
4	D	L*	Q*
5	E	L*	Q*
6	F	L*	Q*
More	G*	L*	Q*

*Actual number must be specified separately.

Thus, the type designation 112XAX10G10 indicates a Struthers-Dunn 112 frame relay having no normally-open contacts (first X); one single-break, double-throw contact (A); and no normally-closed contacts (second X). "10" indicates switchboard mounting studs (see page 36); and G10 indicates the G10 type glass enclosure (see page 36).

Type 84BXXB as another example, indicates an 84 Frame relay having two normally-open, single-break contacts (first B); no double-throw contacts (X); and two normally-closed, single-break contacts (second B).

No special features are indicated by this type designation. Should insulated stud mounting be required, for instance, feature number 16 (see page 36) would be added i.e. 84BXXB16.

MODIFICATIONS

Many non-standard types of relay construction are available. These are identified by special feature numbers added as a suffix to the basic type designations. Available types of mounting are described in Section 10. Other construction modifications, finding relatively wide application, are listed in Section 11.

COVERS AND HOUSING

A recommended cover and housing is listed with each relay throughout the catalog when applicable. The cover or housing symbol follows the feature number on special relays or the contact designation letters on standard front-connected relay.

Cover and housing details will be found in Section 10.

RELAYS FOR SPECIFIC APPLICATIONS

While most Struthers-Dunn relays are listed in their basic form, some are furnished complete with auxiliary equipment for special applications. Such relays are specified using the relay type designations, feature numbers and cover and housing symbols wherever possible. Others are identified as relay sets or panels and assigned "RS" or "RP" numbers.

GENERAL SPECIFICATIONS

COILS: Enameled copper wire on acetate lined insulating bobbins impregnated with insulating varnish. Individual inspection and test. Insulation ample for Underwriters.

CONTACTS: Convex round buttons of fine silver, on brass arms, compression spring mounted and individually adjusted for correct wipe and pressure and break-before-make operation.

CONTACT RATINGS are conservatively based on their ability to break 150% and carry rated load continuously without overheating as required by Underwriters Laboratories, Inc. All ratings are based on non-inductive resistance type loads.

INSULATION: Molded or laminated phenolic or ebony asbestos.

TERMINALS: 6-32 or 10-32 studs with slotted nuts and hardware for front wiring.

PLATING: Ferrous parts cadmium plated, most non-ferrous parts nickel plated. Springs unplated.

ADJUSTMENT: Individual adjustment for operation at 15% under rated voltage on A.C. and 20% on D.C.

INSPECTION: Parts carefully inspected before assembly. Relays individually tested before shipment.

OPERATING POSITION: Base vertical as illustrated is standard. Others require special adjustment.

INDEX

To the most popular of the Struthers-Dunn 5,348 relay and timer types listed in this Quick Guide.

POWER RELAYS

Pages 4, 5, 6 & 7

Industrial • Mercury Contact • Low Voltage D.C. • Aircraft contactors

Conventional magnetic type relays with a specified number of contacts which transfer position when coil is energized and return to their normal position when coil circuit is broken. Classified by size, contact rating and sensitivity.

section

1



SMALL RELAYS

(Military and Commercial)

Pages 8 to 17 incl.

Midget • High Current Midget • General Purpose • Plug-In • Plastic Case Enclosed • Midget Telephone—Military • Miniature and Sub-miniature Aircraft and Missile

Functionally similar to Section 1 Power Relays, but smaller with lower contact ratings for control circuits or for operating small auxiliary devices.

section

2



SENSITIVE RELAYS

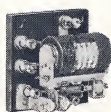
Pages 18, 19

High and Medium Sensitivity

Functionally similar to Section 1 Power Relays, but operate on extremely low currents for use in electronic circuits, with photoelectric cells, in delicate instruments, etc.

section

3



LATCH RELAYS

Pages 20, 21

With electrical reset • Power and Midget sizes for 3-wire or separate circuit control

Contacts, after activation by an impulse to the main coil, remain in the energized position until reset electrically.

section

4



SEQUENCE RELAYS

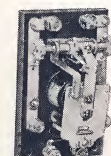
Pages 22, 23, 24

Power • Midget • Multipole • Repeating • Reversing • Electrically Reset

Stepping type relays with cam-operated contacts provide a specified contact sequence.

section

5



INDUSTRIAL RELAYS

Pages 25, 26, 27, 28

Socket mounted • Motor Reversing and Non-reversing Contactors • Multipole.

section

6



INSTRUMENT-CONTROLLED RELAYS

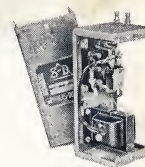
Page 29

Relays, relay-transformer sets, relay-resistor sets for 2- and 3-wire control. Power and midget sizes.

Special combinations of relays, transformers, resistors, condensers, housings, etc.

section

7



TIMERS

Pages 30, 31

Motor Operated • Thermal Time Delay • Inertia Time Delay Types

These can be combined with standard relays to obtain almost any timing arrangement.

section

8



SPECIAL PURPOSE

Pages 32, 33, 34 & 35

Adjustable Overload • Lamp Control • Telephone Signalling • Welding Head Control

Many Struthers-Dunn relays are designed or adapted for specific uses. A few of the more common ones are listed.

section

9



MOUNTING, COVERS, HOUSINGS

Pages 36, 37

Eyelet Terminals • Switchboard Studs • Insulated S-M Studs • Glass Covers • Sheet Metal, Weather-proof and Explosion-proof Housings

These features are available for practically any Struthers-Dunn relay type.

section

10



MODIFICATIONS

Pages 38, 39

Special Contacts • Blowout Coils • Insulation • Coils • Wiring • Manual Buttons • Latches, etc.

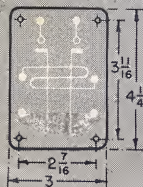
When standard relays do not meet a particular requirement, they can often be modified to do so.

section

11

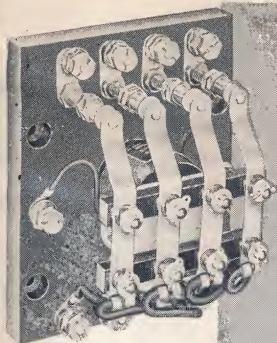


8BXX

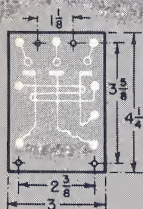


Relay	Contacts	Term.	Price
A8HXX	1 DB NO	4	\$
8XAX	1 SB DT	5	
8XXA	1 SB NC	4	
8BXX	2 SB NO	6	
8AXA	2 SB 1 NO 1 NC	6	

Recommended: H3 metal housing—G2 glass cover.



8DXX



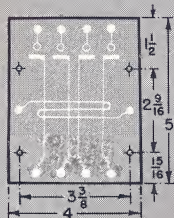
A8CXX

Relay	Contacts	Term.	Price
A8CXX	3 SB NO	8	\$
8DXX	4 SB NO	10	
8EXX	5 SB NO	12	

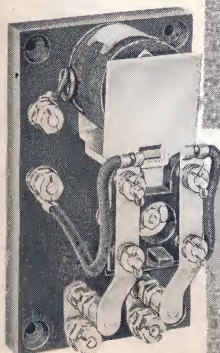
Base diagram for 8EXX is not shown, but will be furnished upon request.

Relay types 8DXX and 8EXX have 300 volt spacing. Larger relays with 600 volt spacing, known as types 84DXX and 84EXX, respectively, are available.

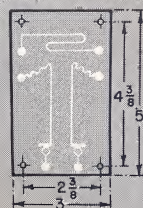
Recommended: Metal housings—A8CXX & 8DXX—H3, 8EXX—H2, glass cover—G6.



8DXX

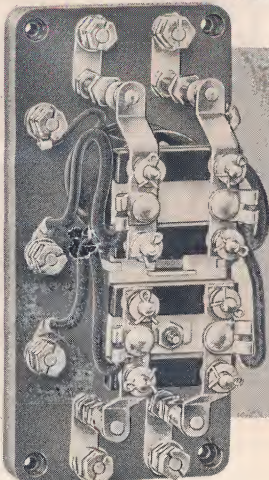


84XXB



Relay	Contacts	Term.	Price
84XXH	1 DB NC	4	\$
84XXB	2 SB NC	6	

Recommended: H3 sheet metal housing—G1 glass cover.



84BXX



Relay	Contacts	Term.	Price
84HXX	2 DB 1 NO 1 NC	6	\$
84BXX	2 SB DT	8	
84BXX	4 SB 2 NO 2 NC	10	

Recommended: H2 metal housing—G1 glass cover.

GENERAL DESCRIPTION

Frames #8 and #84 are single-coil industrial relays with heavy duty contacts which transfer when the coil is energized, and return when deenergized. They are recommended for applications ranging from supervisory and interlocking functions to the control of small motors, heaters, solenoids, audible and visual signals, or for transferring power from a main to auxiliary supply or load.

Contact Arrangement

SB—Single break

DB—Double break

NO—Normally open

DT—Double throw

NC—Normally closed

Only the more popular contact combinations are listed. Other arrangements up to five poles, double-throw are also available. Refer to Data Bulletin 1100 for a complete list.

Contact Rating

Double-Break (DB) Contacts			
Volts	24	115	230
AC (AMPS.)	30	30	30
DC (AMPS.)	30	6	3

Single-Break (SB) Contacts			
Volts	24	115	230
AC (AMPS.)	30	30	30
DC (AMPS.)	30	3	3/4

Ratings apply to open-mounted relays only and are based on continuous, non-inductive resistance loads. Maximum ratings are reduced to 20 amperes when the relays are enclosed. Inrush currents should not exceed 70 amperes.

Insulation Spacing

Contacts are spaced and relays insulated in accordance with Underwriter's Laboratories requirements for 600 volts, except where indicated.

Operating Coils

Shunt coils can be furnished for any single voltage to 550 volts AC or 230 volts DC, and series coils up to 30 amperes. Power consumption is approximately 15 VA AC or 7 watts DC. Common ratings are given on the opposite page.

Terminals:

#10-32 studs with hardware.

Mounting:

Four holes with clearance for #8 screws located as shown.

Depth:

3" max. overall.

COIL DATA

Common 60 Cycle AC Ratings

Voltage	Current in Amperes Inrush	Steady	Coil Gauge
6	6.0	3.3	16
12	2.3	1.3	20
24	1.0	.625	23
115	.210	.125	30
208	.130	.076	32
230	.120	.070	33
440	.055	.030	36
550	.042	.025	37

Inrush values are with armature open and coil cold; steady current with armature closed.

Common DC Ratings

Voltage	Current in Amps	Coil Gauge
6	1.10	28
12	.60	26
24	.30	29
32	.20	31
48	.14	32
115	.06	36
230	.03	39

Current and impedance values with coil hot. Resistance values (coil data table) with coil cold.

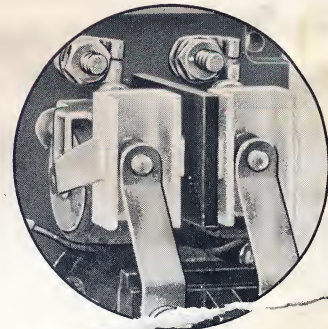
COIL DATA

Coil Gauge	Turns (Approx.)	Resistance DC-ohms	Impedance 60-cy.-ohms
16	145	0.2	2
20	340	1.0	9
21	450	1.8	15
22	650	2.8	27
23	725	3.2	38
24	900	6.2	79
25	1,175	10.2	102
26	1,400	15.0	147
27	1,900	26	260
28	2,300	40	400
29	2,900	60	700
30	3,500	95	900
31	4,250	135	1300
32	6,000	260	2700
33	6,700	365	3300
34	8,800	675	6600
35	10,900	940	8800
36	13,500	1,475	14700
37	16,900	2,300	22000
38	22,500	3,600	—
39	28,600	6,000	—
40	34,000	10,000	—
41	45,000	16,000	—
42	55,000	23,400	—

BLOWOUT COILS

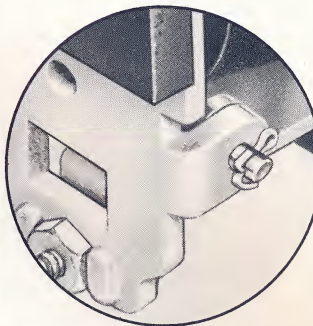
Relays on the preceding page can be furnished with blow-out coils on contacts which must handle direct-current (DC) loads greater than their standard rating. Specify suffix "6" (for blow-outs on all contacts) and the full load DC current without safety factor. Add \$ for SB contacts and \$ for DB contacts. Refer to Section 11 for other feature numbers calling for blow-out coils on certain contacts only. The two most common arrangements are listed below.

Relay	Contacts	Term.	Price
APLXX	DB 	1	\$
8BXX6	2 SB 	6	



HINGE PIN

Shock and vibration resistance can be increased by incorporating a pin type hinge instead of the knife edge construction, as used on 8 and 84 frame relays. Specify by substituting frame 2 for frame 8, and frame 89 for frame 84. Add \$ to the price of the equivalent 8 or 84 frame relay. Frame 89 relays have balanced see-saw armatures, with comparatively better resistance to false contact operation during shock or vibration.



SPECIAL MOUNTING

Special types of mounting are available, such as the 89 frame unit illustrated here, with glass cover, handle and special plug-in terminals and sub-base with receptacles. The cover cannot be removed until the relay is disconnected. More common types of mounting are described in Section 10.



OTHER MODIFICATIONS

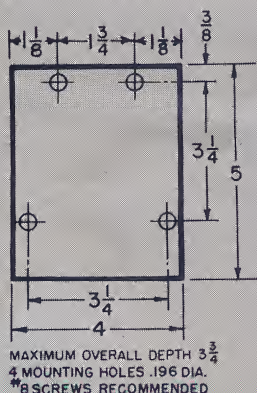
Other features may include special plating such as chrome, nickel and zinc, or special insulation such as ceramic, phenolic and glass-bonded mica. These are usually specified in various combinations, and complete descrip-

tive specifications should be included when ordering or requesting quotation. Popular modifications have been assigned common suffix numbers as listed in Section 11.

30 AMPERE MERCURY SWING TYPES (1, 2 or 3 TUBES)



B22CXX



Dunco Type	Contact Arrangement
B22AXX	1 NO
B22BXX	2 NO
B22CXX	3 NO
B22XXA	1 NC
B22XXB	2 NC
B22XXC	3 NC
B22AXA	1 NO - 1 NC
B22AXB	1 NO - 2 NC
B22BXA	2 NO - 1 NC

Frame B22 units combine the silent operation of swing type relays with the advantage of mercury contacts operating reliably on the order of 5 million times. These features plus high inrush capabilities and constant contact resistance make them ideally suited for applications including use in corrosive atmospheres, control of home heating, studio lighting, laboratory ovens and numerous others where unfailing dependability over many years is essential. Throughout, they are constructed for maximum reliability in minimum size and at moderate cost.

Dunco mercury tubes are made of hard glass that is practically unbreakable under normal use. Ceramic arc chutes in the tubes increase their inrush capacity to five times the normal rating, making them ideal for incandescent lamp loads.

Coil circuits incorporate a full wave bridge rectifier. Thus, coils may be operated on AC frequencies to 400 cycles without hum, and on the same voltage DC. Standard coils are for use on 24, 115 or 230 volts, AC or DC.

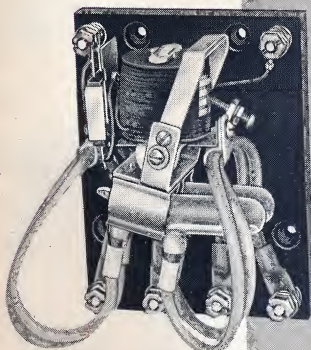
Standard types include up to three 30 ampere tubes; two 60 ampere tubes; or one 100 ampere tube. Multi-tube units are available in a variety of normally open (NO) or normally closed (NC) configurations.

WHEN ORDERING, specify operating coil voltage from following table:

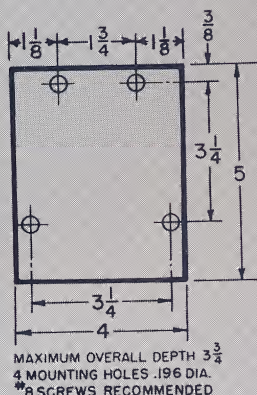
COIL DATA, AC or DC

Volts	Amps.	Resistance
24	.400	62
115	.078	1475
230	.038	6100

60 AMPERE MERCURY SWING TYPES (1 or 2 TUBES)

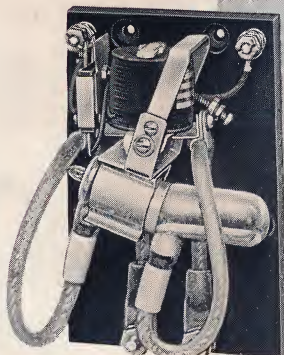


B22BXX3

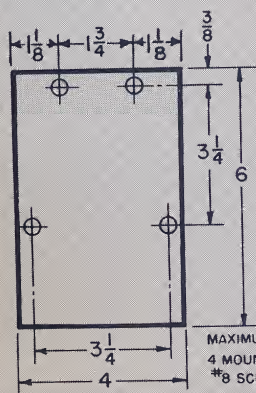


Dunco Type	Contact Arrangement
B22AXX3	1 NO
B22BXX3	2 NO
B22AXA3	1 NO - 1 NC
B22XXA3	1 NC
B22XXB3	2 NO

100 AMPERE MERCURY SWING TYPES (SINGLE TUBE)



B22AXX19






Dunco Type	Contact Arrangement
B22AXX19	1 NO
B22XXA19	1 NC



17 Frame relays for AC or DC operation, with single-pole, single-break, heavy duty $\frac{3}{8}$ " diameter silver contacts for controlling high-current, low-voltage loads. The 17AXX

for DC operation will withstand considerable shock. Contact ratings are for non-inductive loads at 28 volts DC.

Relay	Contacts	Rating	Term.	Price
17AXX	NO 	40 amp.	4	\$
17XAX	DT 	25 amp.	5	
17XXA	NC 	25 amp.	4	





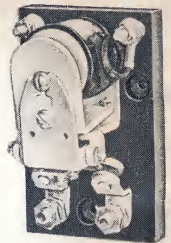
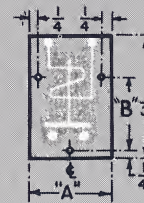
17AXX

Recommended: H6 sheet metal housing—G10 glass cover.

Frame 161 Relays operate on direct current only and are furnished with heavy $\frac{3}{8}$ " diameter single-pole, double-break contacts capable of carrying high currents at low

voltage. Silver contacts are standard. Sintered contacts are available for high-inrush loads. Contact ratings are at 28 volts DC.

Relay	Contacts	Rating	Term.	Dim. "A"	Dim. "B"	List Price
161HXX	NO 	40 amp.	4	2	1 3/4"	\$
161XXH	NC 	25 amp.	4	2 1/4	2"	






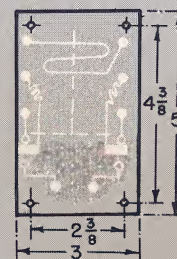
161HXX

Recommended: H6 sheet metal housing.

Frame 162 Relays are essentially larger and more powerful versions of the 161 frames listed above. All single- and double-pole arrangements are available, but only double-pole units are listed (single-pole

units being omitted in favor of the smaller 161 frame.) Special high-inrush contacts can be furnished at a slight increase in price by specifying feature #29 as a suffix to the relay type.

Relay	Contacts	Rating	Term.	List Price
162BXX	2 NO 	40 amp.	6	\$
162XXB	2 NC 	40 amp.	6	
162XBX	2 DT 	40 amp.	8	



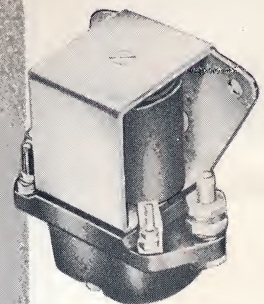
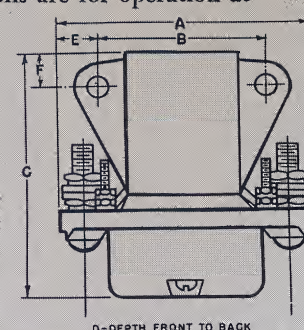
162XBX

Recommended: H3 sheet metal housing.

Frames 101, 102 and 103 solenoid type contactors for DC operation with single-pole, double-break, normally-open, heavy-duty contacts of special silver cadmium oxide alloy for handling extremely high currents at low voltage. Contact rat-

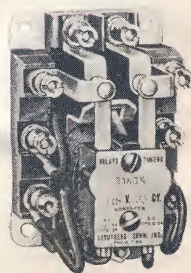
ings listed are for non-inductive loads at 28 v. DC. Standard coils are for operation at 28 volts DC.

Relay	Rating	Dimensions						Price
		A	B	C	D	E	F	
101HXX	50 amp.	2 11/16	1 7/8	2 1/2	1 27/32	13/32	3/16	\$
102HXX	100 amp.	3 3/8	2 1/4	3 3/32	2 3/32	9/16	1/2	
103HXX	200 amp.	4 1/4	2 13/32	3 17/32	2 21/32	5/8	9/16	

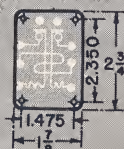


101HXX

SMALL RELAYS • Standard Midget Relays



B1XBX



Relay	Contacts	Term.	Price
B1HXX	1 DB NO	4	\$
B1XHX	1 DB DT	6	
B1XAX	1 SB DT	5	
B1XXH	1 DB NC	4	
B1BXX	2 SB NO	6	
B1AXA	2 SB 1 NO 1 NC	6	
B1XXB	2 SB NC	6	
B1XBX	2 SB DT	8	

Recommended Enclosures: H6 sheet steel housing. G10 glass cover. B1 black plastic "snap-on" covers can also be furnished if the relay base is provided with ball catches. Order as one unit by specifying "B1" as a suffix to the relay type and add \$ to the relay price; i.e., B1HXXB1—\$

Struthers-Dunn Midget Relays are recognized throughout industry as a standard of quality and dependability for control circuit applications and for operating small auxiliary equipment such as motors, heaters, lights, etc., within their contact rating.

Contact Arrangements can be furnished as required. Only the more popular combinations are listed. A single magnet frame will operate up to 3 contacts. Four-, five- and six-pole combinations consist of two magnet frames on a common insulated base with properly selected coils in series, so as to function as a single relay.

Contact Ratings

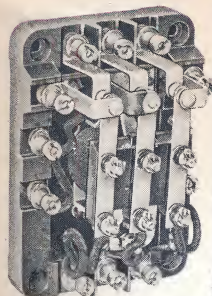
Volts	24	115	230
AC AMPS	6	6	3
DC AMPS	6	0.5	—

The above ratings apply to open-mounted relays, and are based on continuous non-inductive resistance type loads. Inrush on motor or lamp loads should not exceed 20 amperes.

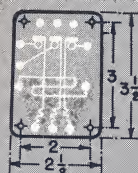
Insulation is in accordance with Underwriters Laboratories requirements for 300 volts.

Coils can be furnished for any single voltage up to 230 volts, 60 cycles AC, or 125 volts DC. Complete coil data and popular ratings are listed on the following page. Series coils are available for currents up to 30 amperes.

Terminals are #6-32 front connected studs complete with wiring hardware.



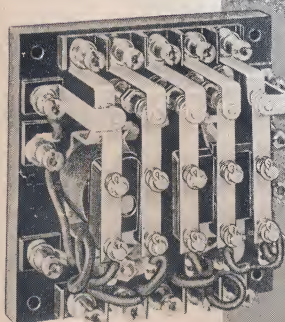
A1XCX



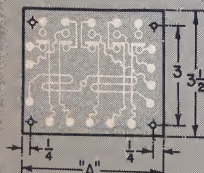
Relay	Contacts	Term.	Price
A1CXX	3 SB NO	8	\$
A1BAX	3 SB 2 NO 1 DT	9	
A1ABX	3 SB 1 NO 2 DT	10	
A1XCX	3 SB DT	11	

The above table includes only basic combinations of N.O. and D.T. contacts. N.C. contacts can be substituted for N.O. contacts at no increase in price.

Recommended Enclosures: H6 sheet metal housing. G10 glass cover.



B58XEX



Relay	Contacts	Term.	"A" Dim.	Price
B58DXX	4 SB NO (4)	10	3	\$
B58XDX	4 SB DT (4)	14	3	
B58EXX	5 SB NO (5)	12	3 1/2	
B58XEX	5 SB DT (5)	17	3 1/2	
B58FXX	6 SB NO (6)	14	4	
B58XFX	6 SB DT (6)	20	4	

The above table includes only relays with 4, 5 or 6 identical contacts—all normally-open or all double-throw. Combinations are also available, and the price can be estimated by interpolation. Normally-closed can be substituted for normally-open contacts at no increase in price. Specify number of each.

Recommended Enclosures:

H3—Sheet metal housing.
G6—Molded glass cover.



Frame 18 High-Current Midget relays are essentially standard Midgets with larger contacts and a higher current rating, for controlling larger auxiliary loads, and match standard Midgets in size and appearance.

Contact Arrangements are available up to two-pole, double-throw as listed.

Contact Ratings

Volts	24	48	115
AC AMPS	15	15	15
DC AMPS	15	5	0.5

Other Parts, including base, terminals, magnetic assembly and coil are identical to those used on standard "Midgets."
















Recommended Enclosures:

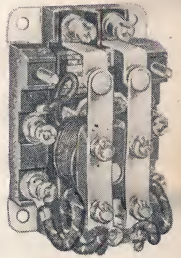
H6—sheet metal housing.

H4—weatherproof housing.

G10—molded glass cover.

B1—black plastic snap-on cover (not recommended when relay contacts carry more than 10 amperes).

Relay	Contacts	Term.	Price
18HXX	1 DB NO 	4	\$
18XHX	1 DB DT 	6	
18XXH	1 DB NC 	4	
18AXX	1 SB NO 	4	
18XAX	1 SB DT 	5	
18XXA	1 SB NC 	4	
18BXX	2 SB NO 	6	
18AXA	2 SB 1 NO  1 NC 	6	
18XXB	2 SB NC 	6	
18AAX	2 SB 1 NO  1 DT 	7	
18XAA	2 SB 1 DT  1 NC 	7	
18BXB	2 SB DT 	8	



18BXX



COILS AVAILABLE

Common 60 Cycle AC Ratings

Voltage	Current in Amperes		Coil Gauge
	Inrush	Steady	
6	1.7	1.1	#360-24
12	.925	.525	#360-28
24	.430	.245	#360-31
115*	.082	.046	#360-38
230	.043	.023	#360-41

Inrush values are taken with armature open and coil cold. Steady current values are with armatures closed and coils hot. Approximate steady power consumption is 5 to 6 volt-amperes.

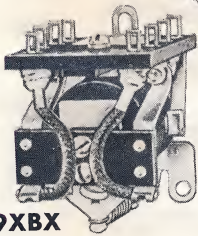
Common DC Ratings

Voltage	Current in Amps.	Coil (Gauge)
6	.495	#360-29
12	.240	#360-32
24	.130	#360-35
32	.090	#360-36
48	.058	#360-38
115	.024	#360-42
125	.020	#7556-42

Coil Data

Coil Stock Number and Wire Gauge	Turns of Wire (Approx.)	Resistance DC Ohms	Impedance 60 cy. Ohms (Approx.)
#360-24	250	1.2	5
#360-25	350	2.1	10
#360-26	400	3.2	13
#360-27	475	4.8	19
#360-28	510	5.6	23
#360-29	645	9.5	37
#360-30	1000	19.	81
#360-31	1100	25.	98
#360-32	1400	40.	162
#360-33	2050	77.	319
#360-34	2500	121.	500
#360-35	2600	145.	542
#360-36	3800	308.	1384
#360-37	4700	430.	1810
#360-38	5400	625.	2500
#360-39	7000	1100.	4545
#360-40	9000	1640.	6851
#360-41	10500	2350.	10000
#360-42	13600	3550.	15555
#7556-42	16800	5100.	—

Power Consumption—Approximately 3 watts.

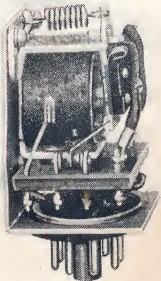


119XBX

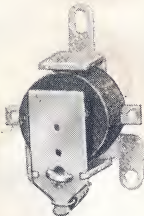
Type 119XBX Relays are inexpensive double-pole, double-throw units listed with Underwriters Laboratories, Inc., as having ratings of 5 amperes non-inductive, or 1/8 H.P. motor load, at 115 volts AC.

Price—\$

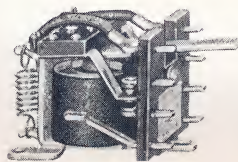
are primarily for quantity production. Standard 119XBX relays, with 115 volt, 60 cycle AC coils are normally carried as stock items and can be purchased in any quantity desired. Other special or modified items must be purchased in quantities of 100 or more identical units. Write for quotation, specifying requirements in detail.



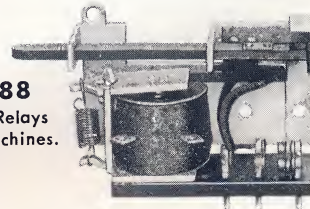
119XBX48
Relay with octal-plug mounting.



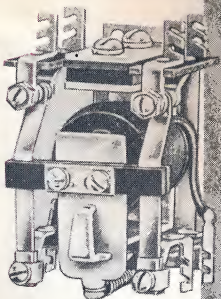
119XXX
Magnet Assembly for mechanical actuation.



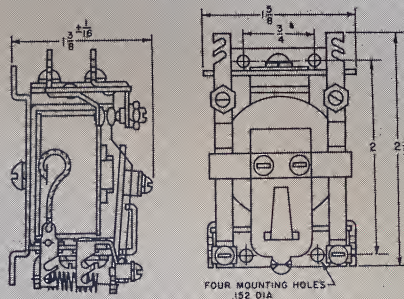
Combination electrical contacts and armature extension for mechanical actuation.



119XBX88
Anti-Jackpot Relays for vending machines.



Type 10XBX is a high quality relay with double-pole, double-throw contacts of fine silver with the following current ratings:

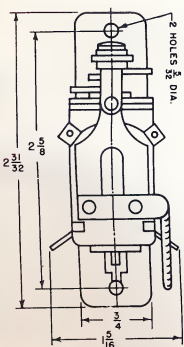


Volts	24	115	230
AC AMPS	10	10	5
DC AMPS	10	1/2	—

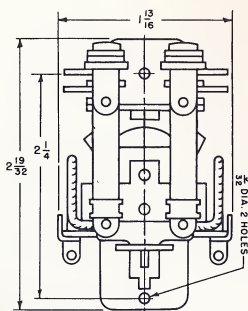
Standard relays contain "midjet" coils (page 9) allowing economical construction for commercial applications.

A larger coil can be furnished at a somewhat higher price, allowing greater sensitivity or extra power. The additional contact pressures thus available enable these relays to withstand the shock and vibration of military applications.

Quotations furnished upon request. Advise quantity and complete specifications.



215XAX



215XBX

Relay	Contacts	Term.	Price
215AXX	1 SB NO	4	\$
215XXA	1 SB NC	4	
215XAX	1 SB DT	5	
215BXX	2 SB NO	6	
215AXA	2 SB 1 NO 1 NC	6	
215XXB	2 SB NC	6	
215XBX	2 SB DT	8	

Frame 215 relays are compact, dependable, high-current units designed for high production and low cost by eliminating essentials.

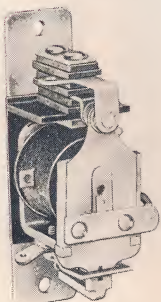
Contact Ratings

Volts	24	115
AC AMPS	15	13
DC AMPS	15	1/4

Insulation spacing is for 150 volts in accordance with Underwriters Laboratories requirements.

Coils are available for use on voltages up to 230 volts, 60 cycles, AC, or 125 volts DC.

Terminals are of the solder tab type with 3/32" diameter holes for #14 AWG wire or smaller.



215XAX

Type 214 Frame Relays handle any general purpose application within their range. They are small in size, light in weight and low in price for relays of their operational dependability.

Outstanding contact reliability is a major feature of this Struthers-Dunn design.

The use of Melamine bonded fibre glass insulation (Grade G5) for all contact supports assures firmly held contacts that will not loosen as a result of temperature and humidity changes. Precise contact alignment is maintained. Operating life is materially improved by use of a wide hinge.

There are two types as illustrated—the plastic encased type for convenient plug-in mounting and the open type.

Each relay is individually adjusted and tested to meet adequate minimum standards of contact pressures, contact gaps and operating performance. Each receives a break-down test of 1,000 volts AC between all components.

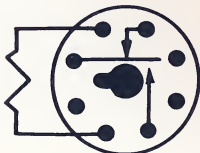
AC relays will operate over a range of 85% to 110% of nominal voltages.

DC relays will operate over a range of 80% to 110% of nominal voltages.

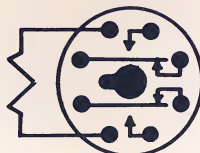
CONTACT ARRANGEMENTS

Standard contact arrangements are: SPDT, DPDT and 3-PDT.

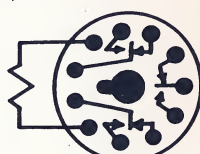
Standard contacts are of fine silver rated 5 amperes, 115 volts AC.



XAX
(SPDT)



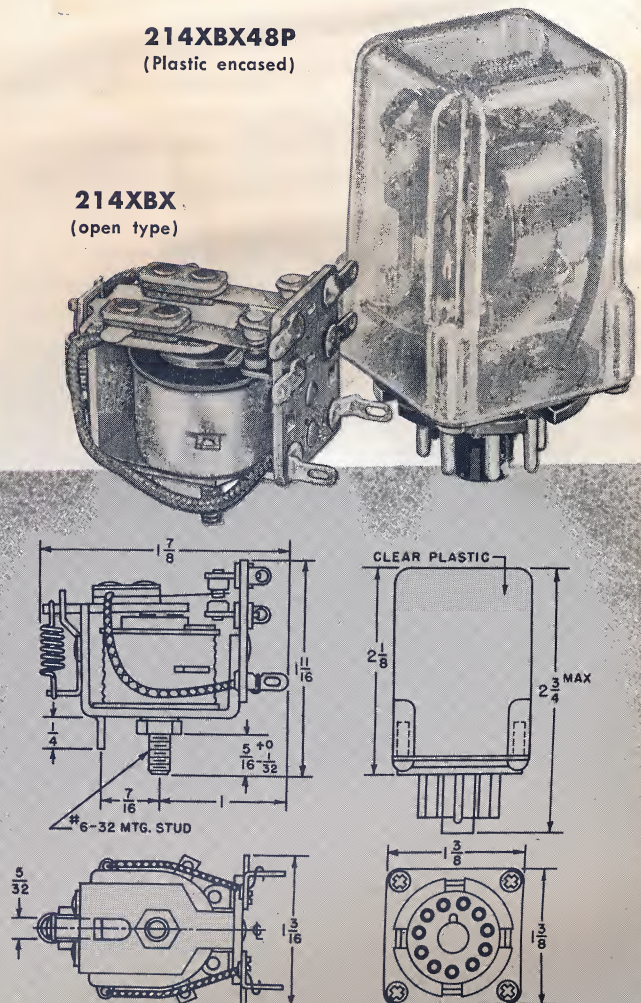
XBX
(DPDT)



XCX
(TPDT)

214XBX48P
(Plastic encased)

214XBX
(open type)



COIL DATA

60-CYCLE COILS			DC COILS		
Volts	DC Ohms	Avg. Ma.	Volts	Ohms	Avg. Ma.
6	5	360	6	30	200
12	20	175	12	120	100
24	80	90	24	480	50
115	2000	17	115	10,000	11.5

TYPICAL 214 FRAME TYPES

Relay (Open Types)	Relay (Enclosed Types)	Contact Arrangement
214XAX	214XAX48P	SP-DT
214XBX	214XBX48P	DP-DT
214XCX	214XCX48P	TP-DT

Midget DC Telephone Type Relays

Frame 180

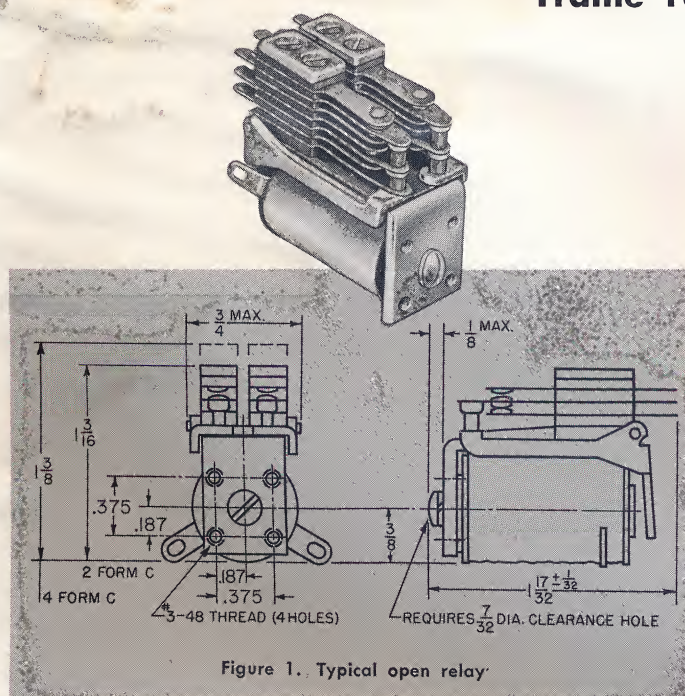


Figure 1. Typical open relay

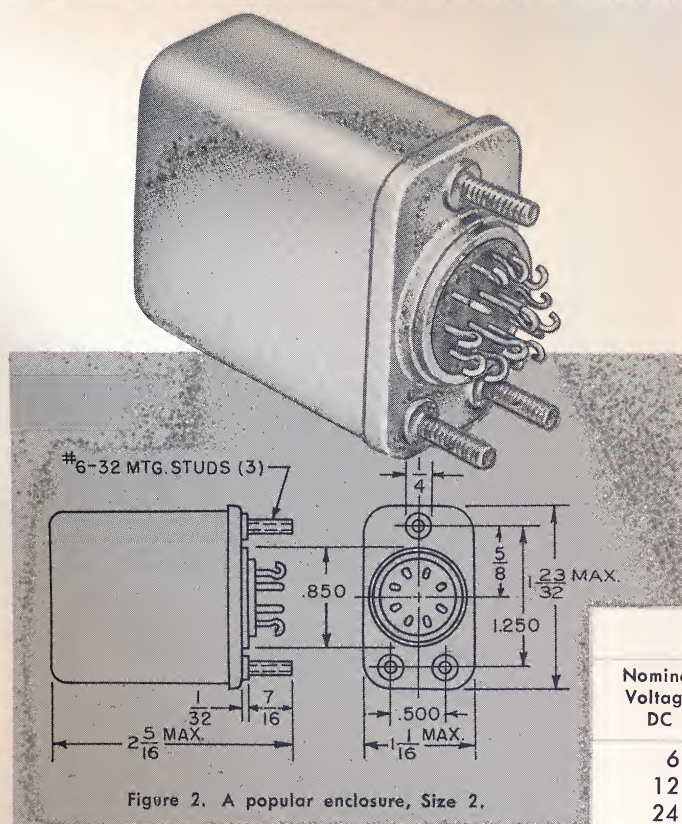


Figure 2. A popular enclosure, Size 2.

GENERAL

Dunco Frame 180 relays are small, general purpose spring pile-up type relays. Coil operating power may be varied over wide ranges to accommodate many contact combinations and various operating conditions. These relays are extremely versatile in application, because of the many coil, contact combinations and enclosures that can be provided.

Ferrous parts are cadmium plated with a chromate finish. Nonferrous parts are not normally plated.

COILS

Coils are single wound on molded Glaskyd bobbins and finished to suit the application.

Standard relay coils for use in ambient temperatures up to 85°C are wound with enamelled wire, covered with cellulose acetate yarn, and treated with acetone to provide moisture resistance.

Specially wound coils may be furnished for operation in 125°C ambient temperatures.

Coils are normally tested for 1,000 volts dielectric strength to frame.

Coils may be selected on the basis of approximately 100 milliwatts per pole for applications that do not require shock and vibration resistance. For typical military applications, to withstand vibrations such as 10G's to 500 cycles and 30G shock, the required coil power is approximately 250 milliwatts per pole.

Unless otherwise specified, coils will normally be selected from the following table which is based on a nominal sensitivity of approximately 1 watt.

COIL DATA TABLE

Nominal Voltage DC	Nominal Coil Resistance Ohms	Normal Pickup 25°C DC Volts	*Special Pickup 85°C DC Volts
6	40	4.8	4.0
12	160	9.6	8.0
24	580	19.2	16.0
48	2400	38.4	32.0
115	13400	92.0	78.0

*For military applications when specified.

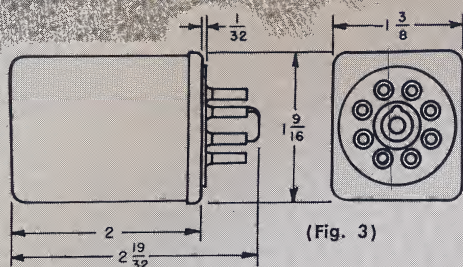
CONTACTS

Contact springs are nickel silver. Contact spacers are melamine bonded Fibreglass. Stack assemblies are pressure clamped and fastened with high tensile strength steel screws. Vibration damper springs are frequently used to improve vibration and shock resistance.

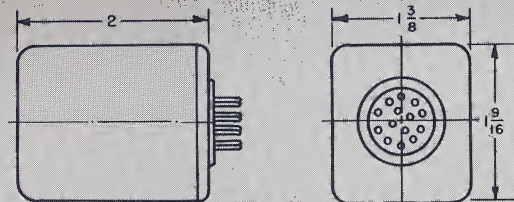
Contact buttons are normally single button palladium $\frac{1}{16}$ " diameter for con-

tact loads to 3 amperes. For contact loads of 5 amperes, fine silver buttons, $\frac{1}{8}$ " diameter are standard. Standard voltage ratings are 28 volts DC and 115 volts AC.

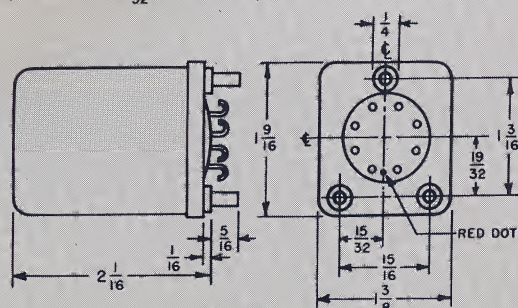
Contacts for special applications including gold alloys, silver-cadmium oxide, split contacts and other forms may be furnished. Contacts are tested for 1,000 volts dielectric strength between poles and between contacts and frame.



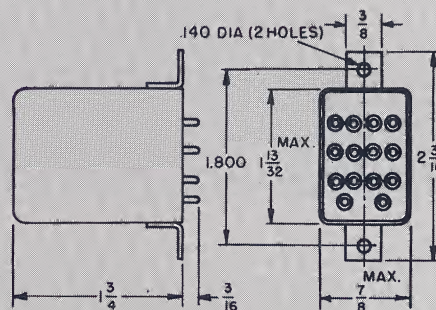
(Fig. 3)



(Fig. 4).



(Fig. 5).



(Fig. 6).

ENCLOSURES

A few styles of available metal enclosures are illustrated in figures 3, 4, 5 and 6. These enclosures are for hermetic sealing. However, many times the sealing is not required and the enclosures are furnished for mechanical protection only.

(Fig. 3). Size 3 enclosure with octal style plug, 8-9-11 or 12 pins.

(Fig. 4). Size 3 enclosure with miniature plug to 14 pins.

(Fig. 5). Size 3 enclosure with hook terminals to 14 pins.

(Fig. 6). Size 11 enclosure with 14 straight wire pins on 0.1" grid.

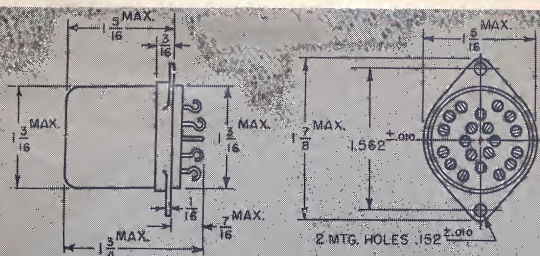
ORDERING AND NEGOTIATION INFORMATION

Details applying to the following basic requirements should be given when ordering relays or requesting quotations:

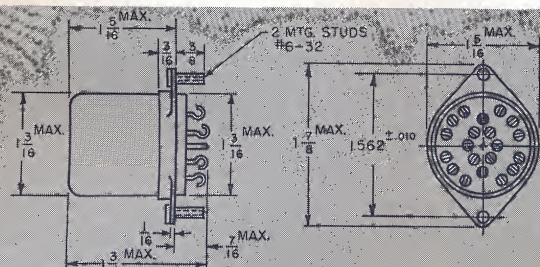
1. Type of enclosure, if any.
2. Type of terminals for enclosed relays.
3. Mounting details.
4. Temperature range.

5. Shock and vibration characteristics.
6. Contact arrangement.
7. Contact ratings, and load characteristics.
8. Coil characteristics including resistance.
9. Applicable paragraphs of Mil Specs.
10. Special requirements.

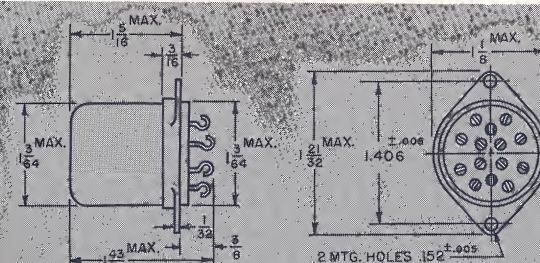
- ... withstand up to 30G vibration at 2,000 cycles
- ... up to 50G shock with no contact chatter
- ... 2,000 ft.—lbs. shock without contact transfer



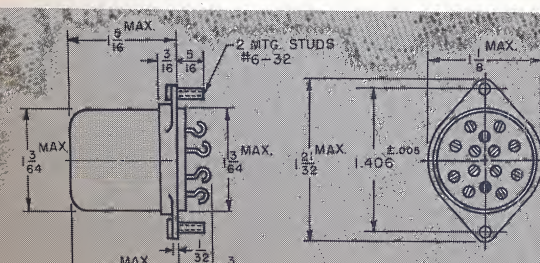
FC-6 and FC-6-125
(Flange with 2 mounting holes)



FC-6-100 and FC-6-126
(Flange with 2 mounting studs)



FC-4 and FC-4-125
(Flange with 2 mounting holes)



FC-4-100 and FC-4-126
(Flange with 2 mounting studs)

FC-4 Relays with *four-pole*, double-throw contacts and FC-6 Relays with *six-pole*, double-throw, contacts are subminiature, hermetically-sealed units specifically designed for the operating and environmental characteristics required for use in guided missiles, piloted aircraft and other military devices.

These relays have been designed for, and are tested for compliance with such specifications as MIL-R-5757D and MIL-R-25018.

The basic designs of Struthers-Dunn FC-4 and FC-6 relays are similar. Balanced, rotary armatures are used in both. Contacts are adjusted with torque gauges for uniformity and to insure sufficient pressures, over-travel and gaps to meet high shock and vibration requirements.

Clean working conditions, many cleaning operations, the use of skilled personnel, and high standards of Quality Control all contribute towards reliable load life for both general purpose and low level switching.

SPECIFIC TYPES

Types	Government Designation	Contacts	Amps.	Weight (oz.)
FC 4-250	RY4LB3B3L01	4P DT	2.	3.0
FC 6-250	RY4LC3B3L01	6P DT	2.	3.5

*Tested in accordance with MIL-R-5757D.
15G, 2000 cycle vibration—50G shock—125°C ambient; 26.5V DC. For complete details see Bulletin RY1.



LOW LEVEL SWITCHING

Standard relays are furnished with contacts suitable for general purpose use, or for low level switching. However, contacts that have been used on general purpose loads should not be operated in low level circuits.

Low level switching requirements should be fully specified as the Struthers-Dunn laboratory is completely equipped to perform run-in miss tests for various low level conditions.

STANDARD OPERATING AND PERFORMANCE DATA

Contact Data (over ambient temperature range)

Rating: 2 amperes at 26.5 Volts DC resistance load.
Life: 100,000 operations, minimum at rated load.
Resistance: .05 ohms (max.) initially; .10 ohms (max.) after life.

Coil Operating Data (over ambient temperature range)

Nominal: 26.5 volts, D.C.
Must Operate: 18.0 volts, D.C.
Must Hold: 14.0 volts, D.C.
Maximum Continuous: 32.0 volts, D.C.

Coil Resistance @ 25°C.

FC-4 Types: 240 Ohms min/280 Ohms max.
FC-6 Types: 190 Ohms min/220 Ohms max.

Ambient Temperatures

FC-4 and FC-6 relays are available for use in two ambient temperature ranges as follows:

—55°C to +85°C.
—65°C to +125°C.

Vibration

15 G to 2,000 cycles with no chatter (30 G when specified)

Shock

50 G, 11 milliseconds, no contact chatter.

Operate Time

15 milliseconds, maximum at 26.5 volts DC.

Release Time

10 milliseconds, maximum at 26.5 volts, DC.

Contact Bounce

250 microseconds maximum, when specified.

Insulation Resistance

1,000 megohms, minimum at 500 volts, DC.

Dielectric Strength

1,000 volts RMS, between any switching circuits; between any switching circuits and coil; between all terminals and case.

Weight

Type FC-6 3.5 ounces max.
Type FC-4 3.0 ounces max.

MODIFICATIONS

Contacts: Materials such as fine silver, gold alloy, gold surface overlaid on silver, palladium and silver cadmium oxide are available.

Mounting: Standard flanges have through holes. These flanges may be relocated for center of gravity mounting, or for mounting at end opposite the terminals. Mounting studs, side brackets and other mechanical modifications may be made.

Headers: Standard are compression seal type with two blue beads for coil identification. Multi-colored beads may be furnished for color coding of terminals.

Terminals: Hook type terminals are standard. Straight wire terminals may be furnished for plug-in, printed circuit or solder connections.

Plug-in terminal headers are frequently gold plated for low resistance between terminal pins and socket inserts.

Voltage: Various coil resistances are available for other than 26.5 volt DC applications.



FC-215 Crystal Can Type DC POWER RELAYS

DP-DT, Hermetically-Sealed Construction

- 10 ampere contact ratings
- Withstand 30G vibration to 2,000 cycles
- 125°C. ambient temperatures

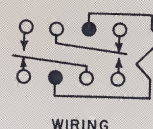
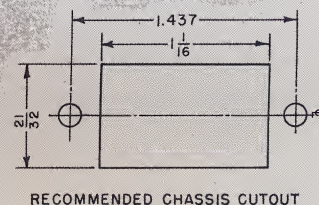
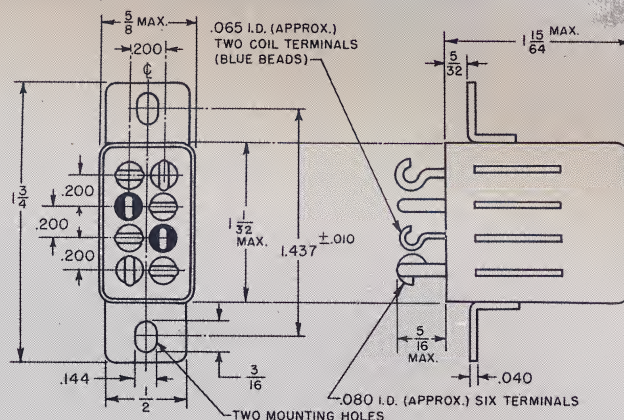
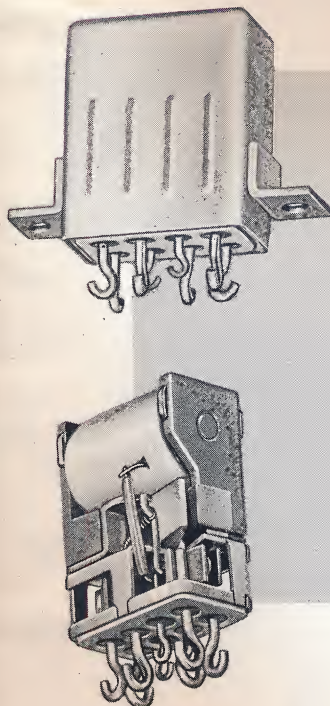
Packed into Dunco FC-215 DP-DT relays is reliability heretofore unattained in small, hermetically-sealed units for heavy duty power service under critical ground and air military uses and at ambient temperatures up to 125°C.

Featuring all-welded internal construction, FC-215 relays operate dependably under high levels of shock and vibration. Possibility of contact contamination from solder flux is eliminated. Assembled by skilled operators under controlled environmental conditions, the relays are laboratory checked and quality controlled during production. Throughout, they

are designed to meet or exceed MIL-R-5757D, MIL-R-6106C and the now superceded MIL-R-25018 requirements.

A balanced armature construction developing high torque characteristics results in contact gaps, pressures and over-travel more than adequate to meet the load handling requirements of severe operating conditions.

Contacts are rated for 10 ampere DC use. Standard coils are rated 26.5 volts DC nominal with 300 ohms coil resistance. Mounting styles include either solder hook or plug-in terminals on 0.2" grid-spaced headers.



SPECIFICATIONS for 26.5 V DC Relays

(Other voltage coils are available)

Contact Arrangement	DP-DT (2 Form C)
Contact Rating	10 Amp resistive at 26.5 V DC
Coil Resistance	300 Ohms Nominal
Operating Data	Must operate at 18 V DC (at any ambient temperature) Must hold at 14 V DC Must release at 1 V DC
Temperature Range	-65°C to +125°C ambient.
Enclosure	Hermetically Sealed.
Shock	50G intensity
Vibration	20G—10 to 2000 cps 30G available on request
Life	100,000 minimum with rated load at 125°C.
Contact Drop	100 millivolts maximum at rated current

Operate Time	15 milliseconds, maximum at 26.5 V DC
Release Time	15 milliseconds, maximum at 26.5 V DC
Dielectric Strength	1000 V AC at sea level between all mutually insulated terminals, and between all terminals and case.
Insulation Resistance	1000 Megohms minimum at 500 Volts
Weight	2 ounces, maximum

MODIFICATIONS

Standard flange mounting with hook terminals on 0.2" grid spacing is dimensioned and illustrated above.

Plug-in terminals may be furnished for use with commercially available sockets.

Mounting flanges may be modified, relocated, or omitted.

Frame 218 Relays combine rugged industrial design with contact multiplicity, compactness and a variation of mounting arrangements previously limited to small telephone-type relays.

Contacts: Adequate silver buttons on heavy flexing arms with surface spacing for 150 volts as required by Underwriters Laboratories, Inc. Individual adjustment assures good gap, wipe and pressure as measured by industrial standards.

Ratings: These relays are generally recommended for control circuits and small auxiliary loads. While their contacts will handle 10 amperes AC without overheating, they are nominally rated as follows to allow long and trouble-free life on applications requiring frequent operation, and to recognize the limitations of some plug-in and solder terminals:

Volts	24	115
AC AMPS	10	5
DC AMPS	5	0.25

Coils are available for any single voltage up to 460 volts, 60 cycles, AC or 150 volts DC. Power drain with standard coils is approximately 10 volt-amperes AC or 5-6 watts DC. Coils requiring less power can also be furnished, depending on the number of contacts, required contact rating, etc.

A great variety of terminal and mounting arrangements are available, with or without sealed or removable covers. Some of the more popular combinations are listed and illustrated. These relays are designed for applications requiring production quantities. Price and delivery will be furnished upon request.

Frame 182 Relays are furnished with DC coils only, otherwise are similar in characteristics to Frame 218 relays.

Basic Construction is a standard open-type unit with solder tab terminals. Relays can be furnished with six single-throw, or four double-throw contacts or with any contact combination requiring 12 contact springs or less. The unit illustrated is type 218DXX, having four single-throw, normally-open contacts.

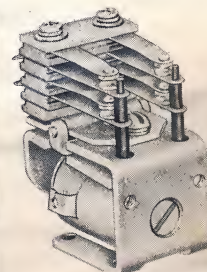
Plug-In Relays without covers or enclosures are mounted on a standard octal or similar plug (up to DP-DT) for quick replacement. Such relays are identified by adding feature #48 as a suffix to the standard open relay designation. The unit illustrated is type 218XBX48 with DP-DT contacts on an octal plug.

Plug-In, Removable Cover relays consist of basic open-type units mounted and wired to standard octal or similar plugs. They are somewhat protected from dust, dirt and damage by a metal cover, which can be removed for inspection or adjustment. Protected relays are identified by adding feature #48 and the metal cover designation (M4, M5, etc.) as suffixes to the basic relay designation. The unit illustrated is type 218CXX48M5 with three normally-open, single-throw contacts.

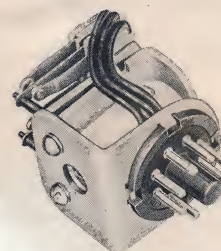
Plug-In Hermetically Sealed relays consist of basic units mounted and wired to sealable type plugs, then solder-sealed in metal cans for complete protection from dust, dirt, harmful gases, moisture, rarified atmosphere, physical damage and tampering. Protected relays are identified by adding feature #48 and the proper sealed can designation (S4, S5, etc.) to the basic relay type. The unit illustrated is type 218CXX48S5 with three normally-open, single-throw contacts.

Solder-Terminal, Hermetically Sealed relays are basic units mounted on sealable headers, wired to individually insulated terminals and solder sealed in metal cans for complete protection from dust, dirt, harmful gases, rarified atmosphere at high altitudes, physical damage and tampering. Protected relays are identified by merely adding the sealed cover designation (S4, S5, etc.) to the basic relay designation. The unit illustrated is type 218ABXS6 with one normally-open, single-throw contact and two double-throw contacts.

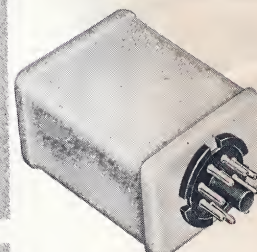
For applications requiring shock and vibration resistance and when DC operation only is involved, 182 Frame Relays are frequently used. Contact rating and enclosure styles are the same as for 218 Frame relays. Struthers-Dunn will select the proper relay for each application upon receipt of full details.



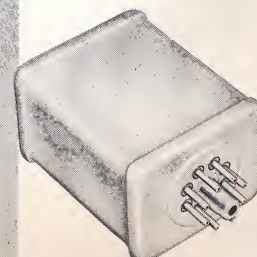
218DXX



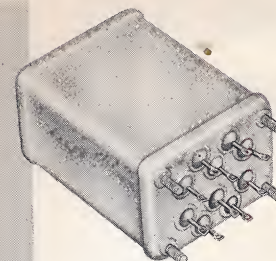
218XBX48



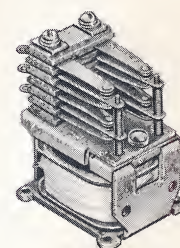
218CXX48M5



218CXX48S5

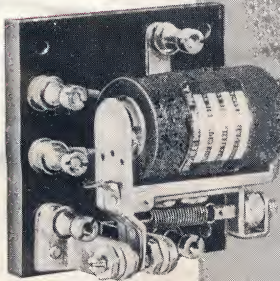


218ABXS6

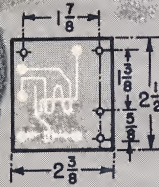


182DX47





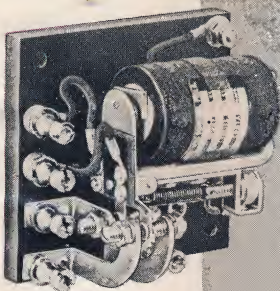
112XAX



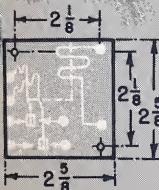
Type 112XAX high sensitivity relay with single-pole, double-throw contact $\frac{1}{2}$ and five #6-32 terminals.

Coil Wire Gauge	20-40	41	42	43	44
DC operation \$	\$	\$	\$	\$	\$
AC operation					

Recommended Enclosures: H6 sheet metal housing
G10 molded glass cover



112XBX



Type 112XBX sensitive relay with double-pole, double-throw contacts $\frac{1}{2}$ and eight #6-32 terminals.

Coil Wire Gauge	20-40	41	42	43	44
DC operation \$	\$	\$	\$	\$	\$
AC operation					

Recommended Enclosures: H6 sheet metal housing
G6 molded glass cover

HIGH SENSITIVITY RELAYS

112 Frame Relays are highly sensitive in that they operate on very low current values, thereby protecting delicate instrument contacts or imposing minimum drain on a limited power source, such as a photo-electric cell, or as encountered in electronic circuits.

Contacts are rated as follows on non-inductive resistance type loads:

Voltage	24	115	230
AC amps.	2	2	1
DC amps.	2	1/4	—

Coils can be selected from the minimum current or voltage values shown in the following table. It will be noted that the single pole relay is more sensitive than the double pole unit and requires less power for proper operation. Other arrangements and adjustments are also available and are described in Data Bulletin 3112.

OPERATING DATA FOR STANDARD RELAYS

112XAX RELAY				COIL DATA				112XBX RELAY			
A.C. (60 cy.)		D.C.		Wire Ga.	No. of Turns	Approx. Resistance (D.C.-Ohms)	Approx. Impedance (60 cy.-Ohms)	A.C. (60 cy.)		D.C.	
Volts	M. A.	Volts	M. A.					Volts	M. A.	Volts	M. A.
1.0	177.	0.08	145.	20	310	.55	6	2.34	390.	0.18	323.
1.4	143.	0.10	117.	21	385	.84	9	2.80	310.	0.22	260.
1.6	116.	0.12	95.	22	475	1.26	13	3.25	250.	0.27	211.
2.0	91.	0.15	73.	23	605	2.1	22	4.40	200.	0.34	165.
2.5	74.	0.19	60.	24	750	3.1	34	5.5	160.	0.41	133.
3.5	52.5	0.25	43.	25	1,050	5.8	60	6.9	114.	0.55	95.
4.3	41.5	0.30	33.	26	1,325	9.0	100	9.1	91.	0.68	76.
5.0	38.0	0.39	31.	27	1,450	12.5	130	10.8	83.	0.86	69.
6.0	31.5	0.49	26.	28	1,750	19.	190	13.1	69.	1.09	57.
8.5	23.	0.62	18.8	29	2,400	33.	370	20.6	50.	1.37	42.
12.0	19.	0.78	15.5	30	2,900	50.	630	26.5	42.	1.72	35.
13.5	15.7	0.95	12.8	31	3,500	74.	860	30.0	35.	2.11	29.
16.	11.8	1.30	9.7	32	4,650	129.	1,350	35.0	26.	2.77	22.
20.	9.65	1.60	7.9	33	5,700	197.	2,070	45.5	22.	3.46	18.
23.	7.65	2.00	6.3	34	7,200	312.	3,000	49.0	16.4	4.33	14.
33.	6.00	2.50	4.9	35	9,200	504.	5,500	72.	13.0	5.47	11.
43.	4.66	3.20	3.8	36	11,800	840.	9,230	95.	10.2	7.11	8.5
55.	3.85	3.90	3.15	37	14,300	1,220.	14,300	122.	8.5	8.53	7.0
67.	2.98	4.80	2.43	38	18,500	1,995.	22,500	146.	6.5	10.8	5.5
87.	2.25	6.40	1.84	39	24,500	3,450.	38,500	190.	4.9	14.1	4.0
103.	1.93	8.00	1.58	40	28,500	5,050.	53,000	230.	4.3	17.7	3.5
130.	1.53	9.70	1.25	41	36,000	7,700.	85,000	285.	3.35	21.3	2.8
146.	1.22	11.70	1.00	42	45,000	11,700.	120,600	320.	2.68	26.0	2.22
168.	.95	16.00	0.84	43	54,000	19,000.	177,000	400.	2.23	35.2	1.85
225.	.74	21.00	0.61	44	74,000	34,000.	300,000	500.	1.63	45.9	1.35

NOTE: Current and voltage values shown are minimum for standard relay adjustment. Current values are in milliamperes and AC values are based on 60 cycle alternating current.

SENSITIVE

section

3

MEDIUM SENSITIVITY RELAYS

29 Frame Relays are also considered sensitive, although they require a little more power for proper operation than the 112XAX relay on the previous page. However, their increased contact rating can sometimes eliminate the need for an auxiliary relay by handling the load directly.

Contacts are rated as follow (non-inductive loads):

Volts	24	115	230
AC amps	6	6	2
DC amps	6	1/4	—

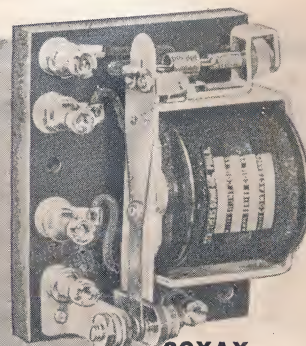
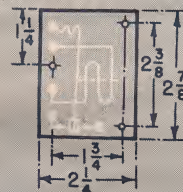
Coils can be selected from the minimum current or voltage values listed in the following table. The same values apply to single or double-pole relays.



Type 29XAX medium sensitive relay with single-pole, double-throw contacts and five #6-32 terminals.

Price—\$

Recommended Enclosures: H6 sheet metal housing. G10 molded glass cover.

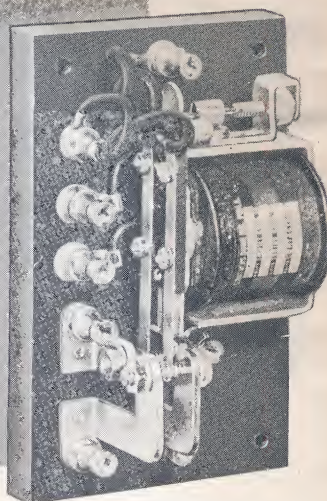
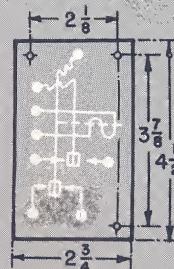


29XAX

A29 Frame medium sensitive relays with double-pole contacts in the following combinations:

Relay	Contacts	Term.	Price
A29XHX	1 DB DT	6	\$
A29BXX	2 SB NO	6	
A29AXA	2 SB 1 NO 1 NC	6	
A29XXB	2 SB NC	6	
A29XBX	2 SB DT	8	

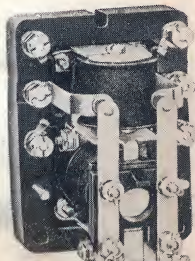
Recommended Enclosures: H3 sheet metal housing. G10 molded glass cover.



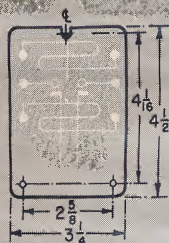
A29XBX

COIL DATA

D.C. OPERATION		SHUNT COILS			60 CY. A.C. OPERATION	
Minimum Voltage	Current (M.A.)	Wire Gauge	No. of Turns	Resistance (ohms-cold)	Minimum Voltage	Current (M.A.)
.140	147.	20	340	0.95	2.19	221.
.200	111.	21	450	1.80	2.76	167.
.244	87.	22	650	2.80	3.89	131.
.255	69.	23	725	3.70	4.35	104.
.370	50.	24	900	6.20	6.52	75.
.432	42.4	25	1,175	10.2	7.14	63.6
.536	35.7	26	1,400	15.	8.67	53.6
.684	26.3	27	1,900	26.	11.30	39.5
.868	21.7	28	2,300	40.	13.80	32.6
1.080	15.6	29	2,900	69.	19.80	23.4
1.36	14.30	30	3,500	95.	21.8	21.5
1.59	11.80	31	4,250	135.	24.5	17.7
2.22	7.94	32	6,000	260.	37.8	11.9
2.72	7.46	33	6,700	365.	40.5	11.2
3.83	5.68	34	8,800	675.	62.5	8.52
4.31	4.59	35	10,900	940.	66.8	6.89
5.48	3.70	36	13,500	1,475.	89.8	5.55
6.72	2.96	37	16,900	2,270.	107.	4.44
8.00	2.22	38	22,500	3,590.	131.	3.33
10.70	1.75	39	28,600	6,100.	157.	2.63
14.5	1.32	40	34,000	10,000.	189.	1.98
17.5	1.11	41	45,000	16,000.	227.	1.67
21.3	.91	42	55,000	23,400.	273.	1.37



A5HXX46



Relay	Contacts	Term.	Price
A5HXX46	1 DB NO	6	\$
A5BXX46	2 SB NO	8	
A5AXA46	2 SB 1 NO 1 NC	8	

Recommended Enclosures: H3 sheet metal housing. G7 molded glass cover.

MEMORY RELAYS LATCH TYPE WITH ELECTRICAL RESET

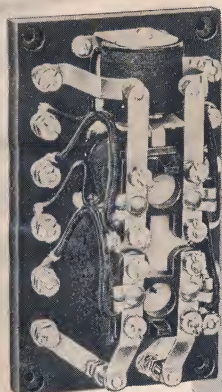
Two Coil Latch Relays operate electrically, latch mechanically and release or reset electrically by lifting the latch with a second coil. These relays are widely used in tripping, lock-up or lock-out circuits and are ideally suited for controlling small motors, heaters and other auxiliary loads, from a two circuit or three wire instrument control system.

Continuous Duty Coils are furnished whenever practical on relays with simple contact arrangements. Such relays are listed in the tables with a feature #46 as a suffix to the relay type.

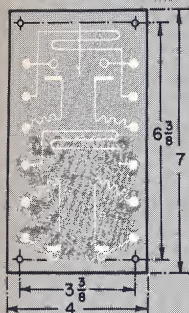
Auxiliary Contacts can be installed at the factory, to break either or both coil circuits after the relay operates. They are particularly recommended to protect delicate instrument contacts, or momentary duty coils on relays which cannot be furnished with continuous duty coils. Specify by adding the following to the relay type and price:

Coil Circuits	Feature	Price
BOTH	75	\$
LATCH	76	
PULL-IN	77	

Essential data, pertaining to Frames A5 and A54 relays on this page, appears at top of page 21.



A5BXX46



Relay	Contacts	Term.	Price
A5HXX46	2 DB 1 NO 1 NC	8	\$
A5BXX46	2 SB DT	10	
A5BXX46	4 SB 2 NO 2 NC	12	

Recommended Enclosures: H11 sheet metal housing. G9 molded glass cover.

TYPE A5CXX RELAY

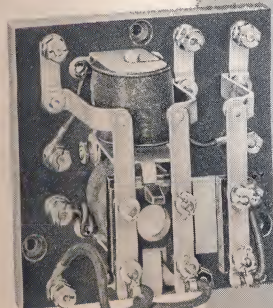
CONTACTS: 3P, SB, ST, NO

DIAGRAM:

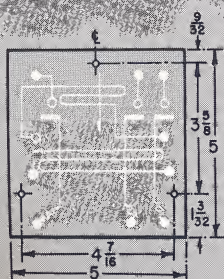
NUMBER OF TERMINALS—10

PRICE—\$

Recommended Enclosures: H10 sheet metal housing. G7 molded glass cover.



A5CXX



TYPE A5DXX RELAY

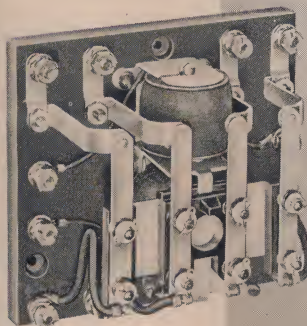
CONTACTS: 4P, SB, NO

DIAGRAM:

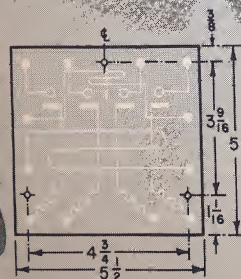
NUMBER OF TERMINALS—12

PRICE—\$

Recommended Enclosures: H10 sheet metal housing. G4 molded glass cover.



A5DXX



LATCH

section

4

FRAMES A5 AND A54 POWER LATCH RELAYS

DOUBLE BREAK CONTACT RATINGS

Voltage	24	115	230
AC Amps	30	30	30
DC Amps	30	6	3

SINGLE BREAK CONTACT RATINGS



Voltage	24	115	230
AC Amps	30	30	30
DC Amps	30	3	3/4

Contacts are conservatively rated as shown in the above table based on handling non-inductive resistance type loads with the relay mounted in the open.

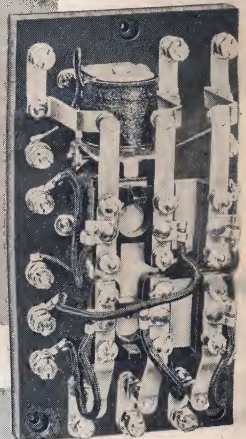
All 30 ampere ratings should be reduced to 20 amperes when the relay is enclosed in a housing.

Coils are available for use on any single voltage up to 550 volts, 60 cycles, AC or up to 230 volts DC. Series coils can be furnished up to 30 amperes AC or DC.



Terminals are #10-32 studs with wiring hardware for front connection.

Relay	Contacts	Term.	Price
A54XCX	3 SB DT 	13	\$
A54CXC	6 SB 3 NO 3 NC 	16	

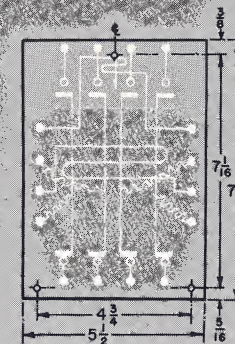
Recommended Enclosures: H11 sheet metal housing. G9 molded glass cover.



A54CXC

Relay	Contacts	Term.	Price
A54DXD	4 SB DT 	16	\$
A54DXD	8 SB 4 NO 4 NC 	20	

Recommended Enclosures: H11 sheet metal housing. G4 molded glass cover.



FRAME 51 MIDGET LATCH RELAYS




CONTACT RATINGS

Voltage	24	115	230
AC Amps	6	6	3
DC Amps	6	0.5	—

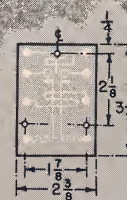
Contacts are conservatively rated as shown in the table, based on non-inductive resistance loads.

Coils are available for use on any single voltage or current value up to 230 volts or 30 amperes AC or DC.


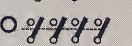

Terminals are #6-32 studs with hardware for front connection.

Relay	Contacts	Term.	Price
51HXX46	1 DB NO 	6	\$
51BXX46	2 SB NO 	8	
51AXA46	2 SB 1 NO 1 NC 	8	

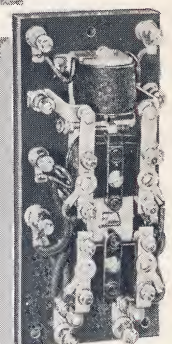
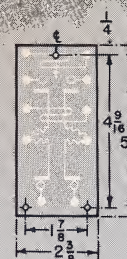
Recommended Enclosures: H3 sheet metal housing. G10 molded glass cover.



51BXX46

Relay	Contacts	Term.	Price
51BXX46	2 SB DT 	10	\$
51DXX	4 SB NO 	12	
51BXX46	4 SB 2 NO 2 NC 	12	

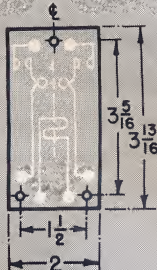
Recommended Enclosures: H3 sheet metal housing. G1 molded glass cover.



51BXX



B11BXX



"B11" Frame Midget Sequence relays with DP-ST fine silver contacts rated as follows, based on resistance type loads:

Voltage	24	115	230
AC Amps	6	6	3
DC Amps	6	1/2	—

Standard Sequence: Type B11BXX relay contacts open and close together while the B11AXA relay contacts open and close alternately as shown in the tables below.

Eight Tooth Ratchets (only) are available for special sequences.

Coils may be furnished for any single voltage up to 230 volts AC or DC and are for intermittent duty.

Six Terminals: #6-32 studs complete with wiring hardware for front connection.

Price—\$

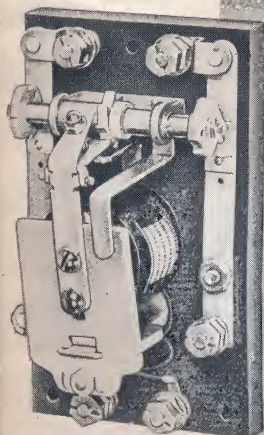
Recommended Enclosures: H6 sheet metal housing. G10 molded glass cover.

Standard Sequence Relays have double-pole, single-throw, cam-operated contacts which repeat a pre-determined sequence continuously. The cams are "stepped" from one position to the next by a momentary impulse to the relay coil, and each contact is then held "open" or "closed" as required when the coil is deenergized.

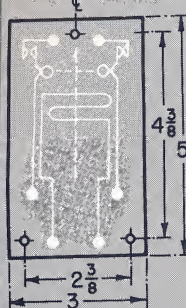
Coils are for intermittent duty only. The energizing circuit should be designed to limit the operating impulse to a few seconds duration.

Standard sequence relays are available in two sizes—the "MIDGET" B11 frame and the "POWER" C85 frame. Proper selection will depend upon the space available, the required contact rating and sequence. Both types utilize eight tooth ratchets as standard and the total cycle for each contact should be divisible into this number (8). However, the C85 frame relays can also be furnished with special cams for any sequence requiring up to 12 steps.

Special Sequence Relays may be furnished at the following additional prices: 8-tooth ratchets add \$ All other ratchets add \$



C85AXA



C85 Frame Power Sequence relays with DP-ST fine silver contacts rated as follows, based on non-inductive loads:

Voltage	24	115	230
AC Amps	20	20	10
DC Amps	20	1	1/4

Standard Sequence: Type C85BXX relay contacts open and close together. Type C85AXA relay contacts open and close alternately as shown in the tables below.

Ratchets—7, 8, 9, 10, 11 and 12 tooth ratchets are available for special contact sequences.

Coils may be furnished for any single voltage up to 550 volts, 60 cycles, AC or 230 volts DC.

Six Terminals: #10-32 studs with wiring hardware for front connection.

Price—\$

Recommended Enclosures: H3 sheet metal housing. G6 molded glass cover.

Relay	Step	1	2	3	4
Standard Contact Sequences					
B11AXA	Cont. A	0	X	0	X
C85AXA	Cont. B	X	0	X	0
B11BXX	Cont. A	0	X	0	X
C85BXX	Cont. B	0	X	0	X
A Few Special Contact Sequences					
B11BXX116	Cont. A	0	X	0	0
C85BXX115	Cont. B	0	0	0	X
A11BXX110	Cont. A	0	0	X	X
C85BXX134	Cont. B	0	0	X	X
B11BXX111	Cont. A	0	X	X	0
C85BXX165	Cont. B	0	0	X	X
B11BXX101	Cont. A	0	0	0	X
C85BXX104	Cont. B	0	0	0	X
0—Contact Open		X—Contact Closed			

MULTI-POLE SEQUENCE RELAYS REPEATING - REVERSING - RECYCLING

Multi-pole sequence relays can be furnished in several forms to serve a variety of functions, three of which are described on this page.

Although the construction of the contacts varies with different models, they all carry the same nominal ratings based on non-inductive loads:

CONTACT RATINGS			
Volts	24	115	230
AC Amps	10	10	5

Cams are non-adjustable and are cut at the factory for the proper contact sequence.

Coils are for intermittent duty, and can be furnished for use on any single voltage up to 550 volts, 25 or 60 cycles, AC. Similar relays, using a different magnetic structure can be furnished for operation on DC.

Terminals: Studs, complete with wiring hardware, for front connection.

Frames 95 and 96 have #6-32 studs, while 99 frame relay terminals are #10-32 size.

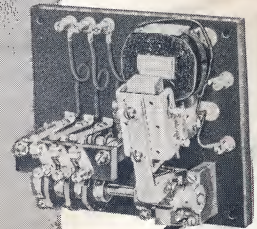
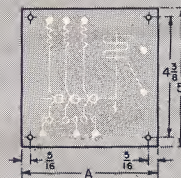


95 Frame Repeating Sequence Relays continually repeat a pre-determined contact sequence in one direction only. The contact cams rotate one step at a time and always in the same direction.

These relays can be furnished with any number of single or double-throw contacts from 1 to 12. Standard units can be furnished for total cycles of 12 steps or less. Gearing can be utilized to extend the total cycle on special units.

Estimating Price Structure

To a basic price of\$
Add for each ST contact
Add for each DT contact



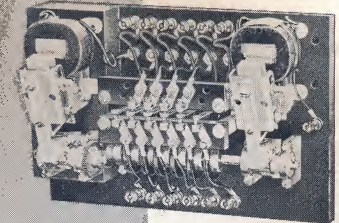
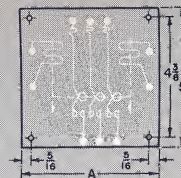
95BXA

96 Frame Reversing Sequence Relays contain "forward" and "reverse" stepping coils which rotate the cam shaft in either direction. They are commonly used to add or subtract circuits, such as transformer taps, resistor banks, etc., and can be furnished with electrical or mechanical stops or interlocks.

They can be furnished with any number of single or double-throw contacts from 1 to 12 and can accommodate any contact sequence requiring 8 steps or less.

Estimating Price Structure

To a basic price of\$
Add for each ST contact
Add for each DT contact



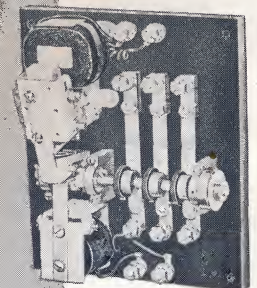
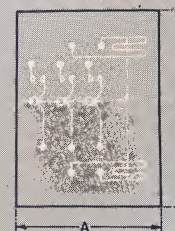
96CXX

99 Frame Recycling Sequence Relays step a spring loaded cam shaft through a pre-determined contact sequence in one direction only. It can be returned to the normal or starting position from any step, or at the end of the sequence, by momentarily energizing the reset coil (provided that the stepping coil is not energized at the same time).

These relays are generally furnished with single-throw contacts only and can accommodate any contact sequence requiring 8 steps or less.

Estimating Price Structure

To a basic price of\$
Add for each ST contact



99CXX

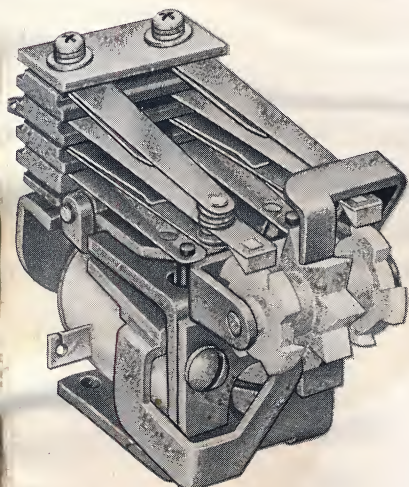
"A" DIMENSION TABLE FOR ABOVE DIAGRAMS

No. Cont.	2	3	4	5	6	7	8	9	10	11	12
95 FRAME	5	5 1/2	6	6 1/2	7	7 7/8	8 3/8	9 1/2	10	10 1/2	11
96 FRAME	7 1/2	8	8 1/2	9 1/2	10 1/2	11	11 3/4	12	12 1/2	13	13 1/2
99 FRAME	5	5 7/8	7 1/4	8 1/8	9	10	11 3/4	—	—	—	—

All dimensions on this page are to be considered as being approximate until verified by a certified base diagram

211 FRAME RELAYS

EXCEPTIONAL SEQUENCE VERSATILITY



Frame 211 Sequence Relays are designed for applications requiring maximum dependability in minimum space. They provide literally thousands of operating sequences—including many unusual ones previously requiring much more complicated control systems. For instance, the optional feature whereby contacts can be made to transfer on either the energizing or de-energizing stroke has provided simplified, low cost schemes for alternating pump and compressor operations. In addition, Struthers-Dunn 211 Relays find wide use in automatic process and machine tool control, traffic control, door and window openers and many more.

FRAME 211 Relays feature a double cam movement on each step. The cam rotates half a step when the coil is energized and completes the step when de-energized. Stand-

ard contacts operate on the energizing impulse, but can be adjusted to operate when de-energized if so specified. Make before break between two ST contacts results when one is adjusted to "make" when energized and the other adjusted to "break" when the coil is de-energized.

The basic magnet assembly is rugged and powerful. Heavy flexing contacts will carry 150% of rated loads. Molded spacers lock contacts into position and provide 150 volt insulation to meet U.L. requirements. Ratchets and cams are of long-wearing Nylon.

Contacts are DP, single or double-throw with eight-tooth ratchets as standard. Six tooth ratchets are available on special order. Coils are available for AC or DC as specified.

CONTACT ARRANGEMENT AND SEQUENCE

Standard S-D 211 Relays have contacts that operate each time the coil is energized in a fixed progression as shown in this table:

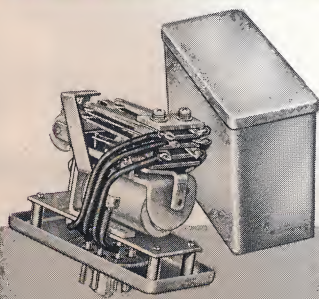
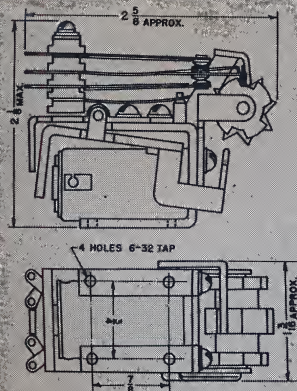
Relay Type	Arrangement	Contact	Step				Additional Steps
			1	2	3	4	
211AXA	DP-ST	#1	0	X	0	X	Repeat
		#2	X	0	X	0	
211BXX	DP-ST	#1	0	X	0	X	Repeat
		#2	0	X	0	X	
211XBX	DP-DT	#1 & #2	Transfer on each impulse				Repeat

"0"—CONTACT OPEN

"X"—CONTACT CLOSED

OPTIONAL SEQUENCE ARRANGEMENTS

Special contacting sequences can be finished when the number of steps in a complete cycle is divisible into 6 or 8 (the number of teeth on available ratchets).



HERMETICALLY SEALED

Frame 211 Relays are available in a complete line of types hermetically sealed in metal covers with standard octal plug mounting. Write for details.

Contact Ratings: Based on straight resistance loads having little or no inductance or inrush, contacts are rated at 5 amperes at 115 V. AC, and at 5 amps. at 24 V. DC, or

0.5 amp. at 115 V. DC. Inrush from motor or lamp loads should be limited to 15 amperes.

STANDARD SPECIFICATIONS

Contacts: Fine silver "buttons" $\frac{3}{16}$ " diameter on phosphor bronze flexing arms.

Coils: Enamelled copper wire on acetate lined bobbins, impregnated and baked.

Terminals: Hot tin dipped solder tabs for up to #15AWG wire.

Adjustment: Operate 15% below rated AC voltage, or 20% on DC.

Operating Position: Vertical with ratchet up.

Life: Minimum life expectancy one million operations, and probable life of many millions under normal conditions.

Weight: 6 ounces.

CONTINUOUS DUTY COILS

COMMON 60 CYCLE AC RATING

Voltage	Current in Amperes		Coil Gauge
	Inrush	Continuous	
12	1.400	.800	26
24	.800	.455	29
115	.150	.085	36
230	.080	.040	39

Power Requirement—10 to 12 volt-amperes

COMMON DC RATINGS

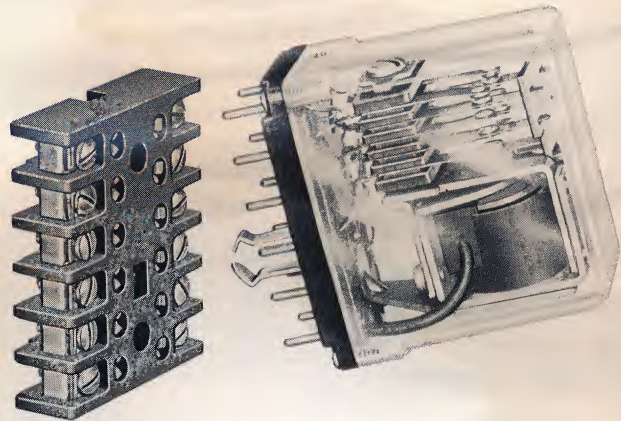
Voltage	Current in Amps.	Coil Gauge
6	.950	27
12	.470	30
24	.180	34
32	.150	35
115	.040	40

Power Requirement—5 to 6 Watts

Many other coils can be supplied to meet the needs of specific applications.

DUNCONTROLS . . . for simplified industrial control

Specifically designed for machine tool and similar control applications, DUNCONTROLS offer maximum space and cost savings; simplified control panel circuitry; ease of installation and maintenance, plus outstanding dependability through millions of operations. Now available in general purpose; two coil latch; sequence; and timer types, all are designed in matching styles for convenient 12-pin plug-in mounting. Clear plastic covers provide effective insulation, mechanical protection and facilitate inspection. All are dimensionally the same except for height. All have 150V electrical spacings of $\frac{1}{4}$ " over surface and $\frac{1}{8}$ " through air and withstand 1500V dielectric test.

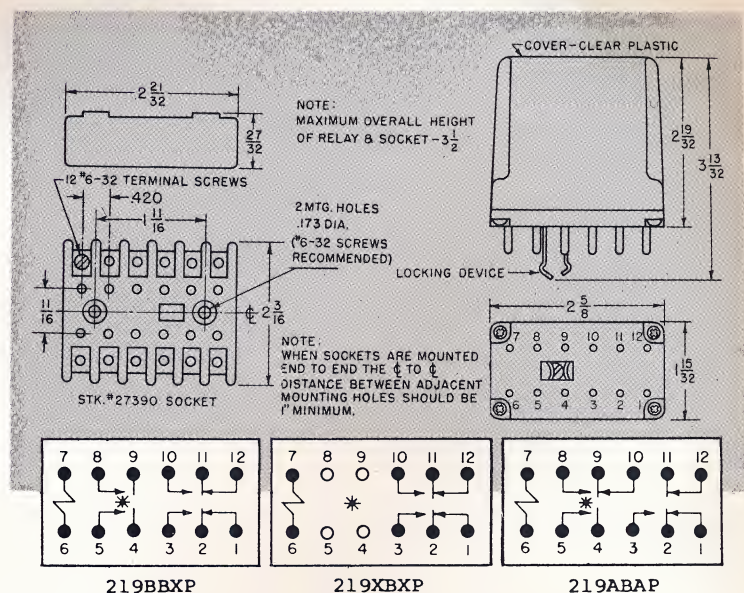


Frame 219 GENERAL PURPOSE TYPE

Duncontrol 219 Frame relays have been outstandingly successful both on laboratory type "tail chasing" circuits and on hundreds of actual machine control installations handling light relay loads. Other loads such as solenoids and heaters are also switched reliably with conservatively rated 10 ampere contacts.

Contact reliability is maintained through 20 million operations. Molded contact spacers with spring type pile-up clamps insure contact tightness and accurate alignment. Standardization of three contact arrangements results in minimum cost and prompt deliveries. Special types having fewer contacts are available on special order. Where fewer contacts are needed for an application, however, it is more economical and entirely practical to specify a standard unit and use only the required number of contacts.

Like their companion DUNCONTROL types shown on the next page, Frame 219 units are mounted on 12-pin plugs for mounting in Dunco #27390 industrial-type sockets. A friction spring on the plug engages a socket well. This polarizes the terminals and prevents the shock and vibration of industrial use from jarring the relays loose.



3 STANDARD CONTACT ARRANGEMENTS

△ (All types can be supplied with neon lamp wired across coil; specify Feature 44)

Type 219XBXp—DP-DT contacts wired to 8 pins of a 12-pin socket.

Type 219BBXp—DP-DT plus 2 normally-open contacts wired to 12 pins.

Type 219ABAP—DP-DT plus one normally-open and one normally-closed contact wired to 12 pins.

SPECIFICATIONS

Enclosure: Clear thermoplastic.

Mounting: Plug-in on Dunco #27390 socket, suitable for table or wall mounting.

Contacts: 10 ampere current carrying capacity.

Insulation: $\frac{1}{4}$ " over the surface, $\frac{1}{8}$ " through air, 1500 volt dielectric test.

Coils: Epoxy Encapsulated. AC to 230 volts; approximately 5.0 VA. DC to 125 volts; approximately 1.6 watts.

Maximum Ambient: 55°C.

△ **Operate Time:** 25 MS.

△ **Release Time:** 20 MS.

Life: 20,000,000 No Load.

Operation: AC relays operate at 85% nominal voltage.

DC relays operate at 80% nominal voltage.

Over Voltage: AC and DC relays withstand 110% nominal voltage without damage.

U.L. Listing: All types except those with 230V, AC coils.

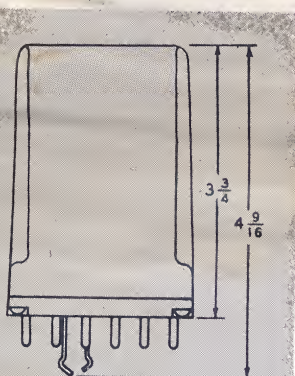
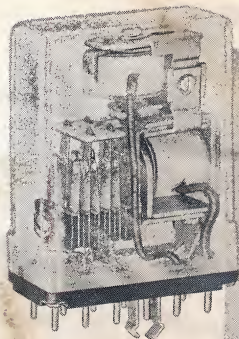
AC RELAYS

Nominal Voltage	Milliamperes (Approx.)		Approx. 60 Cycle Impedance (Hot) Ohms	Approx. Resistance (Cold) Ohms
	Armature Open (Cold)	Armature Sealed (Hot)		
6	1500.	800.	7.2	1.1
12	750.	410.	27.	4.2
24	375.	200.	120.	15.5
115	75.	40.	2700.	540.
230	32.	17.1	13400.	2735.

DC RELAYS

Nominal Voltage	Milliamperes (Approx.)		Approx. Resistance (Cold) Ohms
	Cold	Hot	
6	385	304	15.5
12	189	147	63.5
24	80	64	298.
32	40	67	375.
48	40	32	1190.
115	16	12	7300.

DUNCONTROL LATCH RELAYS . . . Frame 255



Height shown above. Other dimensions same as Frame 219 Duncontrols on preceding page.

STANDARD TYPES

Type 255XBXP with DP-DT contacts.

Type 255XCXP with TP-DT contacts.

Type 255BXP with two normally-open and two normally-closed contacts.

△ Type 255ABXP with one normally-open and one DP-DT contact.

255 Frame mechanical latch, electrical reset Duncontrols combine the popular 219 frame relay (see preceding page) with a unique latching frame. A rigid metal structure provides exact positioning of the two interfering armatures. High contact reliability is assured throughout a minimum life of 10 million mechanical

operations. All contacts are operated by the same armature thus eliminating overlapping closures.

Contacts are rated 10 amperes at 115 volts A. C. Like other relays of the Duncontrol series, frame 255 latch units have 12-pin plug-in base for mounting in Dunco #27390 socket.

COIL DATA

Release Coil (Upper)		Nominal Voltage	Operate Coil (Lower)	
D. C. Ohms	Milliamperes Sealed		Milliamperes Sealed	D. C. Ohms
5	330	6/60	800	1.1
20	165	12/60	410	4.2
80	82	24/60	200	15.5
2300	14	115/60	45	540.
30	200	6 DC	385	15.5
120	100	12 DC	189	63.5
480	50	24 DC	80	298.
10000	11.5	115 DC	16	7300.

Current inrush values on A. C. coils are less than twice the sealed current value. All coils are designed for continuous operation.

Note: Specify operating coils when ordering as relay type numbers do not designate coil characteristics.

DUNCONTROL TIME DELAY RELAYS . . . Frame 235

Frame 235 Time Delay Duncontrols combine 219 Frame relays with epoxy-encapsulated, solid-state delay networks. Timing is screwdriver adjustable over a 90:1 range in either of two standard timing cycles as listed below. External resistances may also be used for remote adjust-

ment of timing, or to provide two or more preset timing cycles from one unit.

Type 235AAXP integrates pulses and "remembers" sum of time energized unless re-set to "zero" after each pulse by an external pilot device. Timing of A235XBXP automatically returns to "zero" after each pulse.

SPECIFICATIONS

Dimensions: Height same as 255 Frame units above. All others same as 219 Frame.

Timing Range: 2 to 180 seconds or 1/5 to 18 seconds before relay is energized. Specify desired timing range when ordering.

Repeat Accuracy: Type 235AAXP—±5% at fixed voltage. Will operate at voltages from 95 to 125 volts, but timing varies inversely with voltage.

Type A235XBXP—±1% under voltage variations from 95 to 125 volts.

Contacts: 10 amps 115 volts AC resistive.

Reset: Relay drops out in 45 milliseconds—ready for immediate timing function.

Insulation: 1/4" over the surface 1/8" through air. Relay will withstand 1500 volt dielectric test.

Life: 20,000,000 mechanical operations.

Power Requirements: 115 volts, 60 cycles, nominal. 95 to 125 volts, maximum operating range. 5 MA during timing cycle: 50 MA hold-in current after timing.

Ambient Temperature Range: 0°C to +50°C.

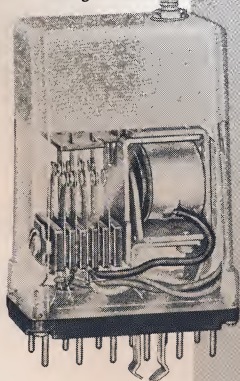
STANDARD TYPES

Type 235AAXP-SP-DT plus extra NO contact. Specify desired timing range.

Type A235XBXP-DP-DT contacts. Specify desired timing range.

Sockets: Dunco Type 27390.

Adjustable timing stud



DUNCONTROL SEQUENCE RELAYS . . . Frame 211

Versatile 211 Frame Relays (see Page 24) are here designed with clear plastic covers and 12-pin plug mounting as companion units to the three other Duncontrol industrial control types. Contact and sequence arrangements, contact ratings and specifications are the same as those listed for 211 Frame Relays on Page 24.

Size: Height same as 255 Frame Duncontrols above. Other dimensions same as 219 Frame Duncontrols on preceding page.

STANDARD TYPES

Type 211AXAP DP-ST (Sequence same as Type 211AXA, page 24)

Type 211BXXP DP-ST (Sequence same as Type 211BXX, page 24)

Type 211XBXP DP-DT (Sequence same as Type 211XBX, page 24)

Type A175KXX Reversing Contactors are ruggedly designed to withstand continuous use and frequent jogging service, and are particularly suitable for installation on small hoists, door and window operators, machine tool auxiliaries and similar applications requiring reversing service.

Construction: The basic unit is known as the type A175KXX and consists of two solenoids on a heavy gauge metal frame, each operating three double-break, normally-open contacts. Overload protection and other auxiliaries have been eliminated to achieve the utmost simplicity and ruggedness at minimum cost. The sole auxiliary device is a mechanical interlock between the two solenoids to prevent one from closing when the other is already energized.

Contacts: Large $\frac{9}{32}$ " diameter fine silver contacts prevent welding on inrush currents and the substantial double-breaking action assures long life in spite of highly inductive loads. The A175KXX is listed with Underwriters Laboratories, Inc. and Canadian Standards Association as having the following ratings:

Ratings

Voltage	Phase	H.P.
110/220	2-3	2
440/550	2-3	3
230	1	1½
115	1	1

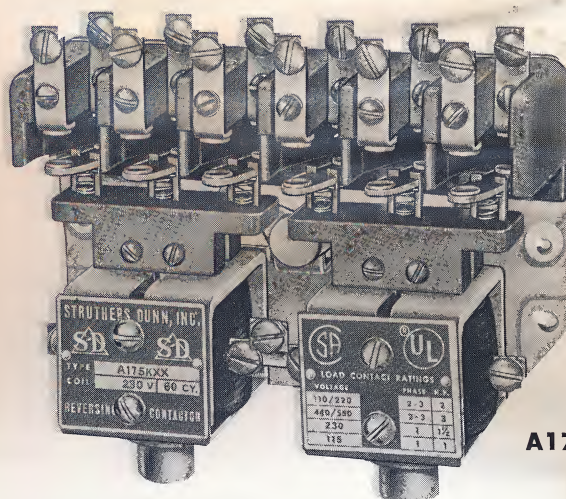
Coils: Standard coils are for operation on 24, 115 and 230 volts, 60 cycles, AC. However, special coils can be wound for any voltage up to 550 volts, 60 or 25 cycles, AC or 230 volts DC.

Terminals: #8-32 binding head screws.

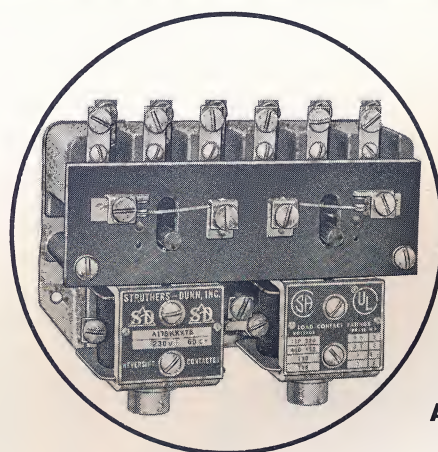
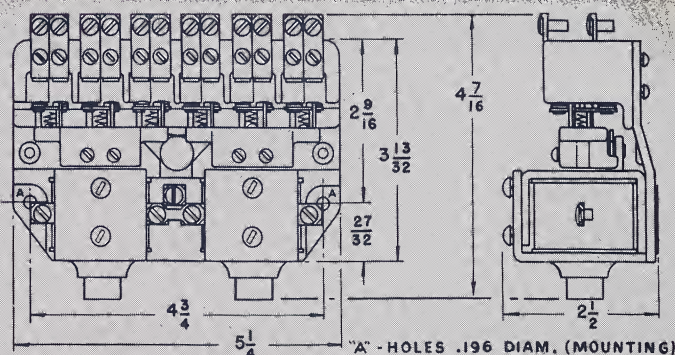
Weight: 2¾ lb.

Modifications: Normally-open auxiliary contacts can be added to provide electric lock-up after one side is energized by a momentary impulse, and until the circuit is broken by a limit switch.

Normally-closed auxiliary contacts can be added to provide electrical interlock by breaking the coil circuit of one solenoid as long as the other is energized.



A175KXX



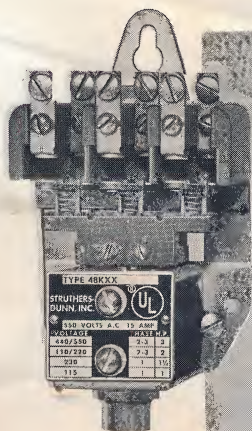
A175KXX78

PRICE LIST

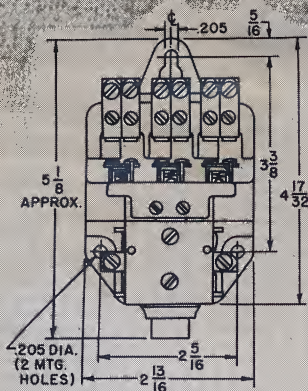
A175KXX Reversing Contactor.....	\$
A175KXX78 Reversing Contactor with normally-open auxiliary contacts for electric lock-up	\$
A175KXX79 Reversing Contactor with normally-closed auxiliary contacts for electric interlock	\$

Recommended housing—H2

3- and 4-pole single unit contactors



3-pole Type
48KXX



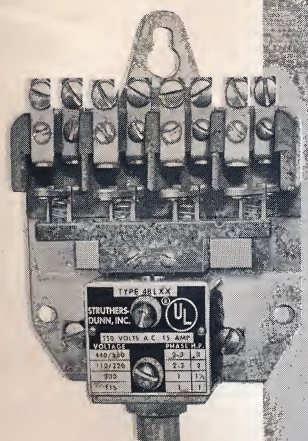
Types 48KXX and 48LXX are single unit versions of the mechanically-interlocked reversing contactor on page 27. Standard contactors are listed with Underwriters Laboratories, Inc.

Small, yet ruggedly built, they are exceptionally well suited for built-in motor control. Fine silver double-break contacts in melamine arc chutes afford a generous safety factor under high overload conditions. Coil and contact terminals are readily accessible from the front for easy installation, even with heavy-gauge wire. Heavy mounting plates offer rigid support and resist twisting or torsional strain which might cause misalignment.

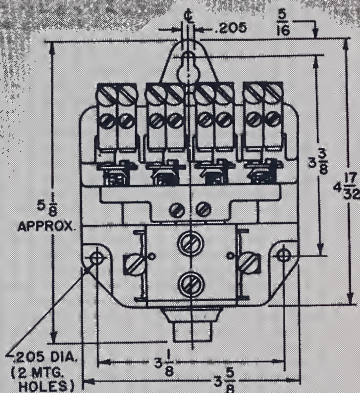
Contacts: Single-throw, normally-open, double break. Each contact pair is individually sprung to maintain accurate alignment.

Coils: Standard AC voltages to 600 volts. Standard DC voltages to 250 volts.

Insulation: Molded melamine with 600-volt spacings.



4-pole Type
48LXX



CONTACT RATINGS

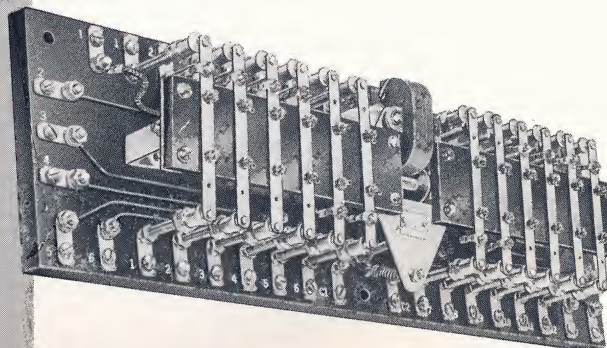
Voltage	AC Phase or DC	HP	Amps.
440/550	2 & 3	3	15
110/220	2 & 3	2	15
230	1	1 1/2	15
115	1	1	15
230	DC		2
115	DC		15



MULTIPOLE INDUSTRIAL RELAYS

Multipole Industrial Relays, frame 290, with as many as twelve double-throw contacts responding to a single powerful magnet assembly. Contacts are nominally rated up to 10 amperes at 250 volts AC. Standard arrangements to date include 8 and 12 poles, with coils for 115 or 230 volts, 60 cycles, AC.

Open relay can be furnished on an insulating base or the entire unit can be mounted in a special sheet metal housing.



290XGX100

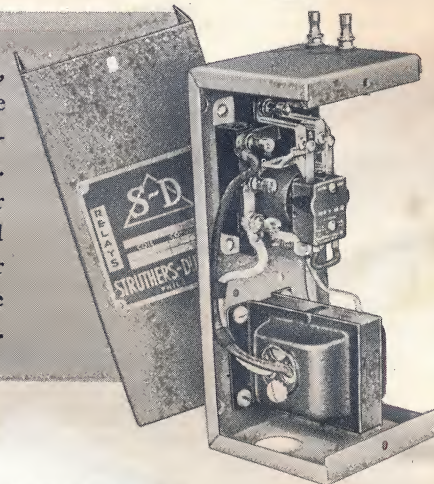
Instrument Controlled Relay Sets are specifically designed for use with regulating instruments, to handle larger loads, protect instrument contacts and thereby increase instrument life.

Thermostats, pressurestats and liquid level instruments usually have relatively delicate contacts requiring low current and/or voltage. In addition, many regulating instruments provide three-wire control, which must be translated into two-wire "on" and "off" load control.

Relay sets combine relays with other devices, such as transformers, resistors, condensers and housings to accomplish a specific purpose. A few popular combinations are illustrated and described on this page, but it is obviously impossible to cover this rather specialized field in a general catalog.

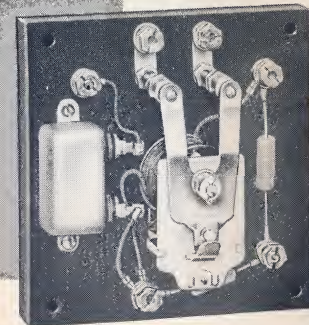
For further information, and a complete description of available instrument controlled relays and relay sets, write for Data Bulletin 6100.

Relay-Transformer Sets ARS 71, RS73, BRS 239 and BRS 240 provide low voltage for the regulating instrument while controlling a standard 115 volt, 60 cycle, AC load. These sets consist of a relay and transformer mounted in a housing, completely wired and provided with handy external terminals for easy connection to the instrument. All sets are listed with Underwriters Laboratories, Inc.



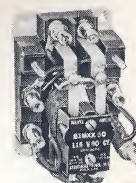
BRS239

Resonant-Circuit Relays include a condenser and resistors in the coil circuit to make them suitable for use with mercurial thermostats. They limit the current on the instrument to 12 ma and yet provide contact ratings up to 30 amperes. The 8HXX55 is for heater control and the 84XXH55 for refrigeration control.



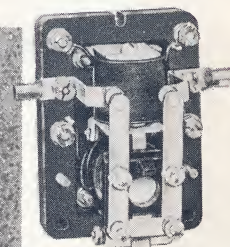
8HXX55

Relay-Resistor Sets convert three-wire instrument control to "on" and "off" two wire operation required by most loads. The "low" instrument contact operates the relay in series with the resistor, and the "high" contact short circuits the relay coil through the resistor. The BIMXX50 and A8MXX50 are used when the control and load circuits are common. The BIAAX50, B1BXX50 and 8BXX50 are recommended when a separate control circuit is used.



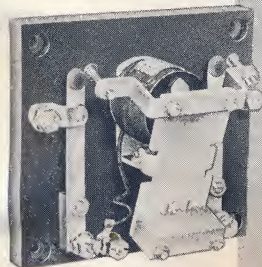
BIMXX50

Latch Relays A54HXX and A54HXX502, when properly wired to a three-wire instrument, and a more or less constant load of more than 500 watts, can be used in universal service on 115 or 230 volts, AC or DC.

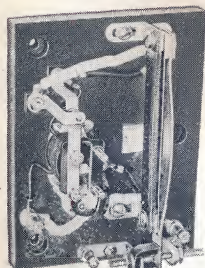


A54HXX502

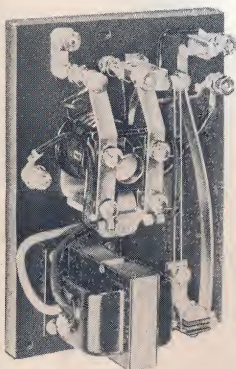




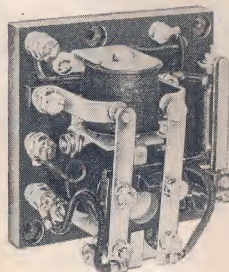
BPWCC1



APBAG1



PHAJ1



PTBL1

Type	Contact Arrangement	Base Size	Type	Contact Arrangement	Base Size
BPWAA1	2 of A	5 $\frac{5}{16}$ x 3	BPWAC1	1 of A, 1 of C	5 $\frac{3}{4}$ x 4 $\frac{1}{4}$
BPWBB1	2 of B	5 x 4 $\frac{1}{2}$	BPWAD1	1 of A, 1 of D	6 $\frac{1}{2}$ x 4 $\frac{1}{2}$
BPWCC1	2 of C	5 x 4 $\frac{1}{2}$	BPWBC1	1 of B, 1 of C	5 x 5
BPWDD1	2 of D	5 x 4 $\frac{1}{4}$	BPWBD1	1 of B, 1 of D	5 $\frac{3}{4}$ x 4 $\frac{1}{4}$
BPWAB1	1 of A 1 of B	5 $\frac{1}{2}$ x 4	BPWCD1	1 of C, 1 of D	5 $\frac{3}{4}$ x 4 $\frac{1}{4}$

- A—Contacts close after delay when coil is energized;
Contacts open immediately when coil is deenergized.
- B—Contacts close immediately when coil is energized;
Contacts open after delay when coil is deenergized.
- C—Contacts open after delay when coil is energized;
Contacts close immediately when coil is deenergized.
- D—Contacts open immediately when coil is energized;
Contacts close after delay when coil is deenergized.

Type BPW Inertia Delay Relays have their armatures weighted for slow operation. The armatures must swing through a considerable arc, resulting in a delay of approximately 0.1 second (maximum) before operating the contacts (either on opening or on closing but not on both).

Contacts are double-pole, single-throw and rated 10 amperes at 115 volts AC. They can be furnished in any combination of N.O. or N.C. contacts with the delay on opening or closing, or on energizing or deenergizing the relay.

The last two letters in the type designation indicate the arrangement of the two contacts as shown in the accompanying tables.

These relays may be used in conjunction with a standard fast-acting relay to assure a proper sequence of operation. The BPWBC1 or the BPWCC1 can translate a sustained current into a momentary impulse.

Price—\$

Thermal Time Delay Relays are actually combinations of relays, thermal elements, heaters, transformers and resistors, as required, to delay operation, or time the running of a load. Components are mounted on a common insulating base and function as a complete unit.

Items 1 to 8 in the following table delay the closing of a normally-open contact for a specified period, after the relay has been energized. Items 9 and 10 close a load contact immediately upon receipt of power, then hold

the load energized for a specified period.

Some units are immediate recycling while others require a cooling-off period before the next operation. The approximate range of available time delays is given in the accompanying table.

All timing and recycling intervals are necessarily approximate and may vary somewhat with atmospheric or other conditions.

For further information, schematic diagrams, etc., write for Data Section 8500.

Item	Type	Delay (Seconds)		Approx. Recycling Time	Contact Rating in Amperes				Base Size in Inches	Net Wt. Oz.	Price	Recom- mended Housing
		Min.	Max.		115 v.		230 v.					
					AC	DC	AC	DC				
Contacts Close After Specified Delay												
1	APHAH1	1	3	5	6	0.5	3	—	7 x 4	34	\$	H11
2	PHAJ1	1	3	5	30	4	30	2	7 x 5	49		H11
3	APHAG2	2	6	0	6	0.5	3	—	7 x 4	34		H11
4	PHAGJ1	2	6	0	30	6	30	3	7 x 6	52		H11
5	APTAH1	15	45	120	6	0.5	3	—	2 3⁄4 x 2 5⁄8	9		H6
6	PTAJ2	15	45	120	30	4	30	2	4 x 4	23		H3
7	APBAG1	20	120	0	6	0.5	3	—	5 x 4	15		H3
8	PBAGJ1	20	120	0	30	6	30	3	5 x 5 1⁄2	32		H10
Contacts Close Immediately and Reopen After Delay												
9	APTBK1	15	60	120	6	0.5	3	—	3 1⁄4 x 3 1⁄8	13		H3
10	PTBL1	15	60	120	30	6	20	3	4 1⁄4 x 4 1⁄2	31		H3

TIMERS

section

8

Repeating Motor Timers continue to repeat a pre-set contact-time cycle as long as the timer motor is energized. The contacts will remain in their respective position if the motor is deenergized during the operating cycle, and the cycle will continue from that point when energy is restored.

Contacts are of the snap-action type and rated as follows:

Type Load	115 v.	230 v.
AC non-ind	10 amp.	5 amp.
AC motor	1/2 HP	1/2 HP

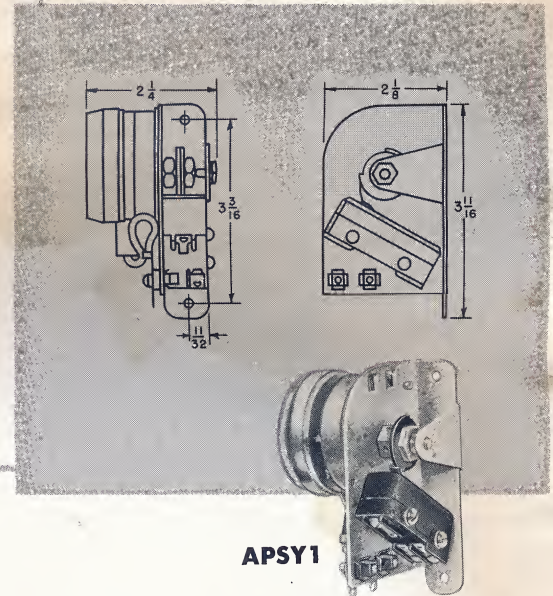
Type APSY1 with 115 volts, 60

cycle, AC, 1 RPM motor and split adjustable cam, operating a SP-DT contact with closure time on one side or the other adjustable from 0 to 60 seconds.

Price—\$

Multipole units are also available, each pole having its individually adjustable cam. A two-pole, 1 RPM, 115 volt, 60 cycle, unit is priced at \$ and a similar three-pole unit at \$

Special timers for other operating voltages and timing ranges can also be furnished at somewhat higher prices.



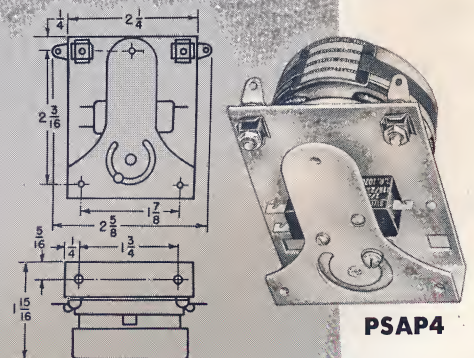
Type PSAP4 Recycling Motor Timer is a compact and inexpensive unit for 115 volts, 60 cycle operation having an adjustable time delay of 5 to 45 seconds (not calibrated). A single-pole, double-throw contact transfers at a pre-set time after the timer motor is energized. Utilizing the stalled-clutch-motor principle, the contact is held in the operated position as long as the motor is energized. The cam is spring returned to its starting position within a fraction of a second after the motor is deenergized.

The SP-DT snap-action contact is rated as follows:

1/2 HP	115/230 v.	AC
10 amp.	115/230 v.	AC
10 amp.	12 v.	DC
1.5 amp.	24 v.	DC
0.2 amp.	125 v.	DC
0.1 amp.	250 v.	DC

Price—\$

A similar unit with a motor for operation on 230 volts, 60 cycles is known as type PSAP2 and is priced at \$



Type PSAU1 Recycling Motor Timer consists of 115 volts, 60 cycle geared synchronous motor which drives a cam shaft through a separate magnetic clutch. One cam-operated contact energizes the load after the pre-set time delay, and the other then deenergizes the timer motor. However, the contacts remain in the operated position as long as the clutch remains energized. When the unit is deenergized, the clutch opens and the cam shaft is spring returned to its normal or starting position, and is immediately ready for the next operation.

The load contact is SP, ST, normally-open, closing after a specified delay, and rated 20 amperes at 115 volts AC, 4 amperes at 230 volts AC, or 1 ampere at 115 volts DC.

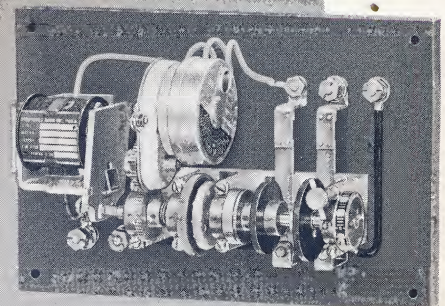
Available timing ranges are as follows: 2.5-50 seconds, 15-300 seconds and 1-20 minutes.

Timing adjustment is made by releasing a thumb screw to the right of the cam-shaft, turning the dial until the graduated scale indicates the desired setting, then tightening the thumb screw.

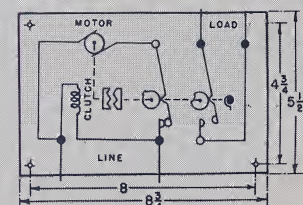
Price—\$

Type PSCU1 Recycling Timer is identical to the PSAU1 type, except that the load contact is normally-closed and opens after the specified delay. The price is the same.

Special timers for other operating voltages and timing ranges can also be furnished at somewhat higher prices.



PSAU1



Frame 31 Interlocked Midget Relays

with silver contacts rated as follows:

Volts	24	115	230
AC Amperes	6	6	3
DC Amperes	6	1/2	—
AC H.P.	—	1/4	1/4

Coils are available for any single voltage up to 230 volts, 60 cycles, AC or 115 volts, DC.

Terminals listed in the table are #6-32 front connected studs with all wiring hardware.

Relay	No. Cont. Ea. Side	Term.	"A" Dim.	Price	Recommended Housing	Cover
31BXX	2	12	3 7/8	\$	H3	G6
31CXX	3	16	4 1/8		H3	G7
31DXX	4	20	4 3/4		H2	G7

Interlocked Relays are recommended for certain special applications where one circuit or group of circuits must be held open as long as another is energized. The A175KXX reversing contactor smaller and of a different shape (as described on Page 27) is recommended for most motor-reversing applications, but interlocked relays can also be used when size, shape or mounting position warrant.

Two relays are mounted on a common insulating panel, with an interlock engaging the armatures to prevent one from closing if the other is already energized.

Standard panels have 4, 6 or 8 single-throw, single-break, normally-open contacts; that is, 2, 3 or 4 contacts on each side of the interlock. Ampere ratings are based on non-inductive resistance type loads, while horsepower (H.P.) ratings are based on normally inductive motor loads.

Dynamic braking or electrical interlock usually require normally-closed contacts. One such contact can be substituted for a normally-open contact on each side at no increase in size or price.

Frame 38 Interlocked Power Relay

with silver contacts rated as follows:

Volts	24	115	230
AC Amps	30	30	25
DC Amps	30	3	0.5
AC H.P.	1/4	1	1

Coils are available for operation on any single voltage up to 550 volts, 60 cycles, AC or 230 volts DC.

Terminals listed in the table are #10-32 front connected studs with wiring hardware.

Relay	No. Cont. Ea. Side	Term.	"A" Dim.	Price	Recommended Housing	Cover
38BXX	2	12	5	\$	H2	G7
A38CXX	3	16	7 3/8		H13	G8
A38DXX	4	20	9		H13	G8

Type 126XXA Motor Starting Relay for use with capacitor-start, induction-run, single-phase AC motors. The relay coil is connected across the motor running winding, and its contact opens the starting winding when the motor approaches full speed. Permanent magnet detents (rather than return springs) provide the proper characteristics for positive and dependable operation.

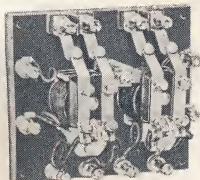
These relays are often used to replace "built-in" centrifugal switches, which are furnished on many motors as standard equipment. Relays can, by their nature, be more ruggedly designed for greater dependability and longer life, and external mounting allows easier inspection, adjustment or replacement.

Prices: In accordance with specifications upon request

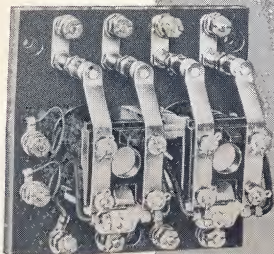
Type 130BXX100 Single-Phase Motor Reversing Relay is recommended as a built-in component of "package" control units for operating overhead doors or windows, dumb-waiters and similar equipment requiring reversing 3-wire, 1ϕ AC motors up to 1/3 H.P. These relays consist of two magnet assemblies, each operating two contacts—one for electric

lock-up and the other controls the load. Operating parts are protected from dust, dirt, moisture and tampering by a heavy metal frame and cover. Solderless connectors allow quick and easy installation. Additional information and diagrams are given in Data Section 7210.

Price—\$



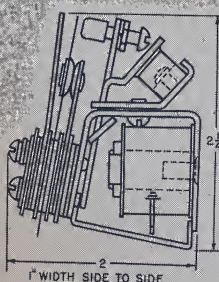
31BXX



38BXX



126XXA



130BXX100



SPECIAL PURPOSE

section

9

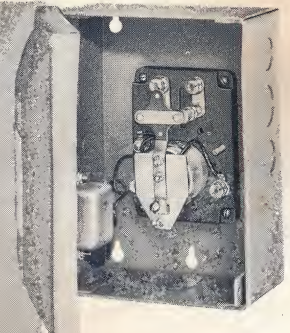
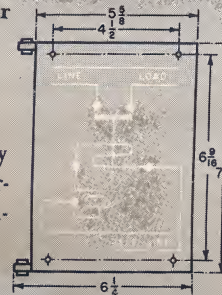
Type 4HXX56H3 Telephone Auxiliary Relay for operating audible or visual signals with a separate local power source, when energized by a telephone ringing current. The set consists of a relay and condenser in a sheet metal housing wired per the diagram. This combination will operate on 8 ma at 90 volts, 20 cycles with 9500 ohms impedance.

Contacts are rated 10 amperes AC or 3 amperes DC at 115 volts.

Price—\$

Type 4HXX56W6 is the same relay set mounted in a type W6 weather-proof housing for outdoor installation.

Price—\$

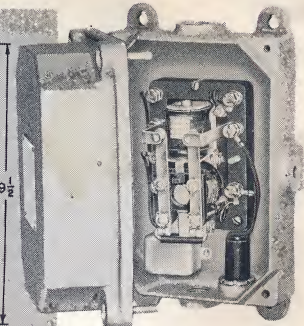
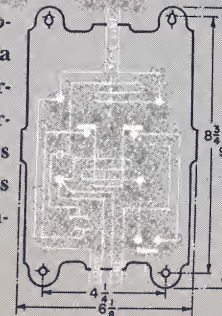


4HXX56H3

Type A5XXH501W6 Telephone Auxiliary Reset Relay, after an initial impulse from a telephone ringing circuit, operates audible or visual signals continuously from a separate local power source. It is then reset by hand by means of a push-button in the bottom of the housing. It is particularly suitable for police and taxicab

call stations. The set consists of a two-coil latch relay and condenser in a W6 weatherproof housing with wiring per diagram. The latch coil operates on 10 ma at 90 volts, 20 cycles with 7500 ohms impedance. Contacts are rated at 10 amperes AC or 2 amperes DC at 115 volts.

Price—\$

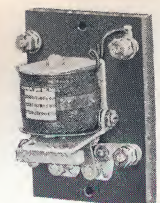
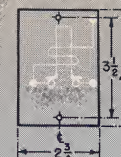


A5XXH501W6

Type 20XXH5 Emergency Lamp Relay features a series coil for holding the contacts open as long as the main lamp is burning, and a gravity-operated weighted armature for closing the circuit to the emergency lamp,

if the main lamp fails. Contacts are double-break for operating emergency lamps up to 800 watts AC or 100 watts DC.

Price—\$



20XXH5

Close-Differential Relays are marginal units sensitive to slight changes in current or voltage. Numerous adjustment points, balanced armatures, and permanent magnets for minimizing armature drift allow these relays to be adjusted to a minimum of 5%* differential between pull-in and drop-out. Contacts are single-pole, double-throw and rated 6 amperes at 115 volts AC, 3 amps at 230 volts AC, or 1/4 ampere at 115 volts DC. When ordering, always specify the required pull-in and drop-out adjustments in addition to the relay type! Relays will fit H2 housing and G6 cover.

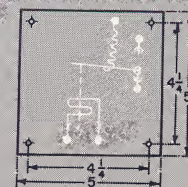
$$* \% \text{ Differential} = \frac{(\text{Pick-up}) - (\text{Drop-out})}{\text{Pick-up}} \times 100$$

Type 49XAX for DC Operation utilizes a cup frame and solenoid plunger mechanism.

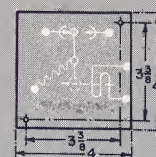
Price—\$

Type 149XAX for AC Operation utilizes an inductor ring actuating mechanism, which holds to close tolerances over a wide temperature range. The principle of operation is described more fully at the top of page 35.

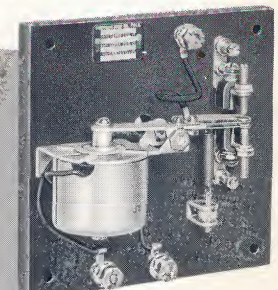
Price—\$



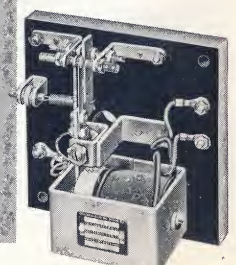
49XAX



149XAX

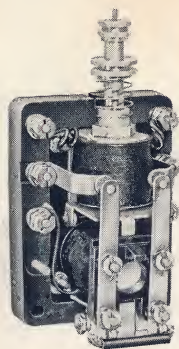


49XAX



149XAX



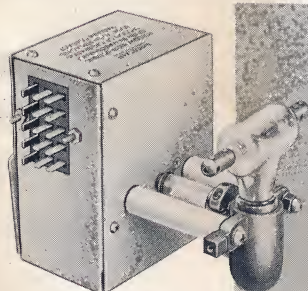


A55HXX

Adjustable Overload Relays—frame A55 with momentary delay to allow passage of transient currents—and frame A56 with instantaneous trip—provide overcurrent or overvoltage protection for many common types of circuits having little or no inrush. They are not recommended for motors and similar loads requiring inverse time protection.

The upper coil on the relay is generally a low resistance coil providing overcurrent protection to a load in series. However, it may also

be a shunt coil for connecting across the load for over-voltage protection. A knurled nut at the top allows adjustment of the tripping value over a 3:1 range. When the preset current value passes through the upper coil, it lifts a mechanical latch, allowing the lower armature and contacts to drop open, thus disconnecting the load. The contacts remain open until the relay is reset by a momentary impulse to the lower coil. The relay can also be provided with an insulated button on the lower armature for manual closure.



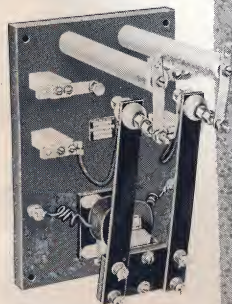
78CCA101

Vacuum Switch Relays are also for use in high voltage circuits and are often applied in electronic "keying" operations. The contact arrangement in the high voltage circuit is a single-pole, double-throw vacuum switch rated 9200 volts maximum peak standoff voltage.

In addition to the high-voltage vacuum tube contact, many of these relays are furnished

with auxiliary contacts for operation on normal 115 or 230 volt circuits with ratings of 5 amperes or less.

A common type of construction is illustrated having a vacuum switch contact and numerous auxiliaries in a metal enclosure. Another type of construction has been furnished on a insulated base.

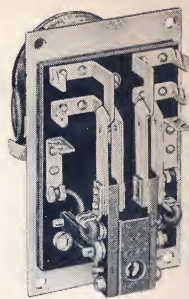


90XBX

High Voltage Relays find their major application in low current or electronic circuits, or in transferring circuits without having to "make" or "break" the load. Struthers-Dunn, Inc. has furnished H.V. relays with spacing and insulation for use up to 45KV. Such relays are obviously not designed to replace circuit breakers, but they can be used in certain applications to effect considerable savings.

All high voltage relays (over 600 volts) are custom-built for each application, and complete information must be forwarded to S.D. for recommendation. Spacing is dependent on so many variables that no "rule of thumb" applies, and the relay is usually designed to maintain the spacing used throughout the rest of the circuit.

Further general information is contained in Data Section 1500.



91XBX100

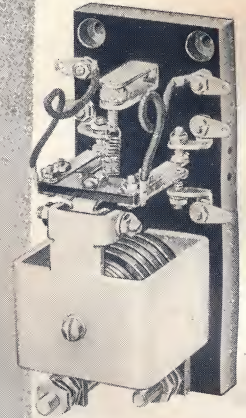
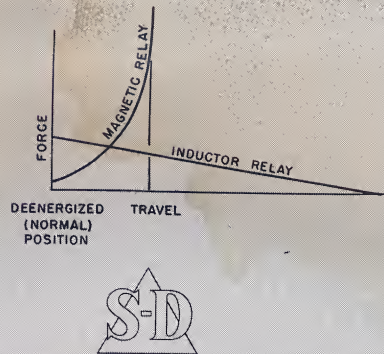
Voice Circuit Relays with double-pole, double-throw, multifingered, sliding contacts for transferring voice circuits without the usual "click" encountered when ordinary contacts open and close. Six flexing fingers make up each movable contact and slide from one solid silver stationary contact to the other in a make-

before-break manner. The multiplicity of contact making members assures continuity at all times. The contacts are rated in milliamperes and millivolts and should not be subject to heavy currents. Coils can be furnished for 115 or 230 volts AC.

AC Inductor Relays, such as type 201XBX100 illustrated, operate on a somewhat different principle than ordinary magnetic relays. A radically different force-travel characteristic makes these relays particularly well suited for certain close-differential applications.

Part of the AC magnetic flux passes axially through a non-magnetic ring, inducing a current in it. Other flux passes radially through the ring and an interaction between these causes a thrust which drives the ring away from the coil.

Characteristic force-travel curves of standard magnetic relays and of inductor relays are shown in diagram form for comparison. A magnetic relay starts with a low force which increases rapidly as the armature approaches the pole face, while the inductor starts with a lower peak force, which decreases gradually throughout its somewhat longer stroke.

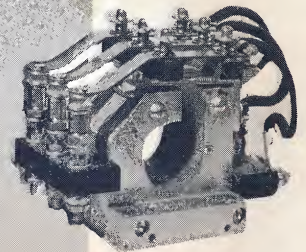


201XBX100

Relays for Automatic Welding Head Control and Similar Uses

Designed for welding head control on electric arc welders, Type 192CXX100 relays are also useful in other applications where relays may be energized by large cable currents. Striking of the arc closes three normally-open load contacts which remain closed until the arc is interrupted. 125 amps. are required for pick-up and closing of contacts. However, 180 amps. are needed

to seal the armature and assure quiet operation. Frame accommodates up to 4/0 insulated cable. Contacts are rated 30 amps. at 115 volts AC. Current-carrying parts are insulated for minimum of 1250 volts AC breakdown. Approximate dimensions including metal cover are 4 7/16" long x 2 7/8" wide x 3 3/8" deep.



192CXX100

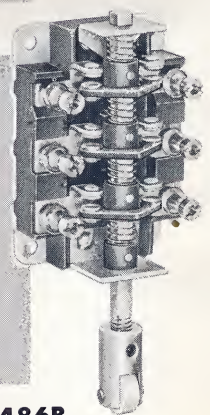
Limit Switches, such as the type CX2486B illustrated, have been designed by Struthers-Dunn, Inc. to economically meet the requirements of special applications. The external actuating mechanism should provide quick make-and-break to the limit switch contacts.

The unit illustrated is built on a standard midget relay base and provided with three, double-break, normally-open contacts, a stain-

less steel plunger and nylon roller.

Contacts are rated 6 amperes at 115 volts AC or 24 volts DC and 3 amperes at 230 volts AC. Unit is designed for 300 volt spacing throughout.

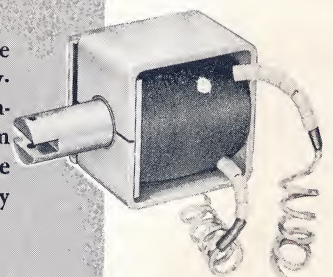
Other designs can usually be made up economically from the thousands of Struthers-Dunn relay and switch parts available.



CX2486B

Solenoids have been specialty products at Struthers-Dunn since its inception 30 years ago. However, no attempt is made to compete with the many laminated structures for AC operation already on the market. By far the greater number of S-D solenoids, which have been manufactured to date, have been small units for DC operation.

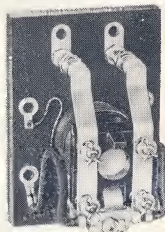
Hundreds of special designs and parts are available to Struthers-Dunn engineers, allowing them to furnish new designs with a minimum number of new parts and a minimum amount of tooling. New designs can thus be furnished in large or small quantities for many special applications at a reasonable cost.



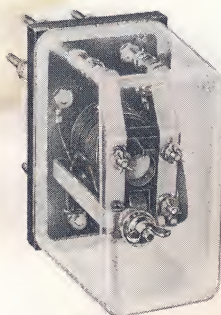
48XXX



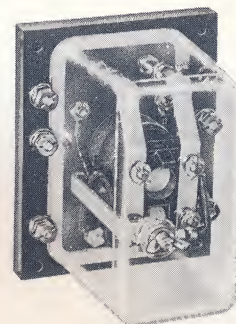
8BXX



8BXX12



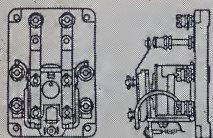
8BXX10G2



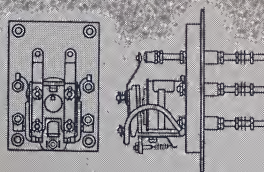
8BXX11G2

Mounting Arrangements, which are available for nearly all Struthers-Dunn insulated-base relays, can best be illustrated by the diagrams and pictures on this page. Relay 8BXX, as listed on page 4, will be used as an example, but almost all insulated-base relays in this catalog may be furnished with similar variations in construction.

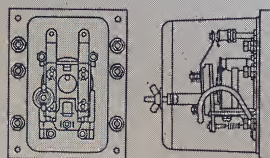
Standard Construction, as listed and illustrated throughout other sections of this catalog, consists of a relay with front connected terminals, complete with wiring hardware, but without an enclosure or cover of any kind. Such relays are described as "open, front-connected" and can be mounted on either a metal or insulated panel, since the base provides proper insulation to ground.



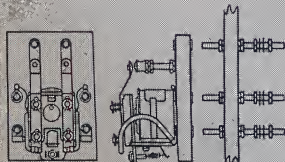
Insulated Studs—Feature 16—also extend out the back of the relay base and each stud is furnished with an insulating sleeve for mounting on a metal panel. Increase the price per table 1.



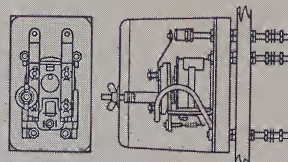
Front Connected Relays With Glass Cover—Feature (11G-)—necessitate an over-sized base in order to "bring out" the relay terminals. Add for the terminals from Table 1 and for the cover from Table 2 to the standard relay price.



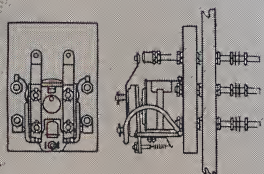
Eyelet Terminals—Feature 12—can be furnished at no increase over the standard front-connected relay price. These are hollow rivets which slide over studs or plugs which are permanently mounted and wired on the switchboard, allowing quick relay replacement.



Switchboard Studs With Glass Cover — Feature (10G-)—utilizes a cut base the same size as the glass cover. Add for studs from Table 1, and for a glass cover from Table 2, to the standard relay price.



Switchboard Studs — Feature 10—can be furnished, extending out the back of the relay base, for making back connections on an insulating switchboard. Add per table 1 to the standard relay price.



Insulated Studs With Glass Cover — Feature (16G-) utilizes a cut base the same size as the glass cover. Add for insulated studs from Table 1, and for the glass cover from Table 2, to the standard relay price.

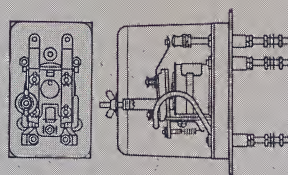


Table 1—PRICE ADDITIONS PER TERMINAL

Line	Type of Mounting	Terminal Size	
		6-32	10-32
1	Switchboard Studs		
2	Insulated Switchboard Studs		
3	Front Terminals on Glass Covered Relays		

Table 2—PRICE ADDITIONS FOR GLASS COVERS

Cover Type	Base Size in Inches		Price Addition
	*Front Connected	Back Connected	
G1	7 1/2 x 5 1/2	7 x 3	
G2	5 x 4	4 1/2 x 2 3/4	
G4	11 x 8 1/4	9 1/4 x 6 1/2	
G6	7 x 5	5 x 5	
G7	10 1/2 x 7 1/2	8 1/4 x 4 7/8	
G8	12 x 6 1/2	10 1/2 x 5	
G9	10 1/2 x 7 1/2	8 1/4 x 4 7/8	
G10	5 x 4	4 1/2 x 2 3/4	

*Base sizes of front connected relays may be larger than tabulated, if additional space is required to accommodate the required number of terminals.

MOUNTINGS, COVERS, HOUSINGS

section

10



H17



H3



H2

Sheet Metal Housings are available in considerable variety, as illustrated and listed. The recommended enclosure for each individual relay is listed throughout this catalog. All housing prices on this page include the mounting of one relay. When ordering a housing-mounted relay, it is only necessary to add the housing designation as a suffix to the relay type designation, and add the housing price to the standard front-connected relay price.

A number of relays can also be mounted in a single housing of appropriate size. A nominal addition of \$ is made for mounting the second relay, and for each additional relay.

A gray crackle finish is standard and will be furnished unless otherwise specified. Although not as quickly available, sheet metal housings can also be furnished in black or aluminum, with smooth or crackle finish, or in smooth or "Newark" gray.

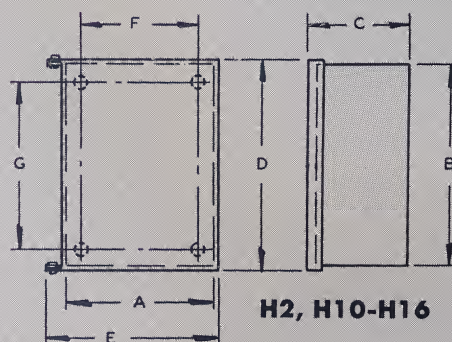
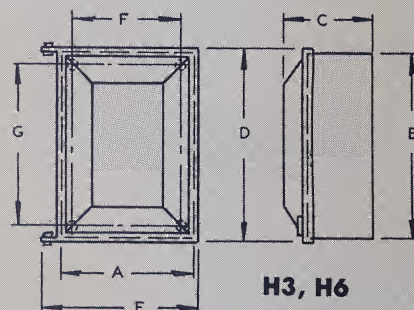
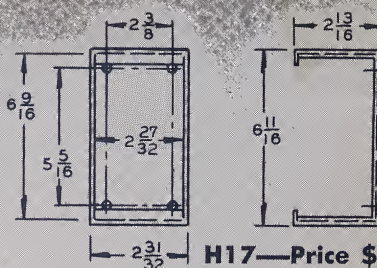
SPECIAL HOUSING

H4 Weatherproof housing for midgets (1 & 2 pole) and other small relays—cast iron with gasket and cover—for outdoor locations—tapped for 1/2" conduit—\$

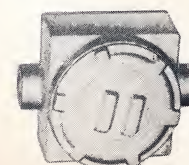
W6 Weatherproof housing for larger relays (to 5 1/2" x 4 1/4" base)—cast aluminum with gasket and screw fastened cover for outdoor locations—tapped for 1/2" conduit top and bottom—\$

H9 Explosion-Proof housing for midgets (1 & 2 pole) and other small relays—cast iron with screw-on cover and 3 5/8" round opening—3/4" threaded hubs, one on each side—no mounting holes—\$

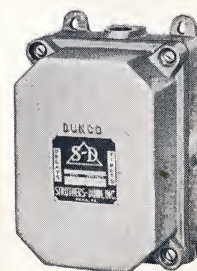
H21 Explosion-Proof housing for larger relays (to 5" x 5" base)—cast iron with screw-on cover and 5 1/2" diameter opening—3/4" hubs top and bottom—two 1 3/32" mounting holes—\$



H4



H9



W6

Dim.	A	B	C	D	E	F	G	Price
H2	6	8 3/8	4 1/8	8 5/8	6 7/8	4 3/4	6 3/4	\$
H3	5 1/4	7 5/8	3 3/4	7 7/8	6 3/8	4 1/2	6 5/8	
H6	3 7/8	6 3/8	3 5/8	6 5/8	4 3/4	2 5/8	4 1 5/8	
H10	8	8	4 1/8	8 3/8	8 7/8	6 3/4	6 3/4	
H11	8	10	4 1/8	10 5/8	8 7/8	6 3/4	8 3/4	

Dim.	A	B	C	D	E	F	G	Price
H12	10	10	4 1/8	10 5/8	10 7/8	8 3/4	8 3/4	\$
H13	8	12	4 1/8	12 3/8	8 7/8	6 3/4	10 3/4	
H14	10	12	4 1/8	12 3/8	10 7/8	8 5/8	10 5/8	
H15	12	12	4 1/8	12 3/8	12 7/8	10 3/4	10 3/4	
H16	12	15	4 1/8	15 3/8	12 7/8	10 5/8	13 3/8	

FRAME NUMBER INDEX

The following is a partial list of Struthers-Dunn frame numbers, and includes only those mentioned in this catalog. There are again as many, which represent specialized equipment and cannot be covered in a gen-

eral catalog of this nature. The following are listed numerically by frame number, with the corresponding catalog section and page numbers:

Relay Frame	Catalog Sec.	Page
A1, B1	2	8, 29
4	9	33
A5	4	20, 21
A5	9	33
8, A8	1	4, 5
8	7	29
10	2	10
11	5	22
17	1	7
18	2	9
20	9	33
B22	1	6
29, A29	3	19
31	9	32
38	9	32
48	6	28
49	9	33
51	4	21
54	4	21
A54	7	29
A55	9	34

Relay Frame	Catalog Sec.	Page
B58	2	8
78	9	34
84	1	4
85	5	22
90	9	34
91	9	34
95	5	23
96	5	23
99	5	23
101	1	7
102	1	7
103	1	7
112	3	18
119	2	10
126	9	32
130	9	32
149	9	33
161	1	7

Relay Frame	Catalog Sec.	Page
162	1	7
A175	6	27
180	2	12, 13
182	2	17
192	9	35
201	9	35
211	5	24, 26
214	2	11
215	2	10
218	2	17
219	6	25
235	6	26
255	6	26
290	6	28
FC	2	14, 16
APB	8	30
CX	9	35
PH	8	30
PT	8	30
APS, PS	8	31
BPW	8	30

MODIFICATIONS

STANDARD CONSTRUCTION

Only one type of construction is considered standard for each relay or group of relays as illustrated in Sections 1 through 7 of this catalog. Such relays are generally identified with a frame number (175), which might also include a prefix letter (A175), and be followed by three contact designation letters (A175KXX), as explained on page 2. (Note: Time delay relays in section 8 use an entirely different designation system.)

SPECIAL FEATURE NUMBERS

When a standard relay structure is to be modified or changed in any way, a special feature number is added (as a suffix) to the standard type designation.

NUMBERS UNDER 100

Most numbers from 1 to 99 have been assigned to modifications which are common to many or all relays. Therefore, a number smaller than "100"

always identifies the same feature, regardless of the type of relay on which it is used. A list of such numbers is given on the opposite page.

NUMBERS "100" AND ABOVE

When a special type of construction is not covered by a "common" feature, or when it combines several of them, a "special" number is assigned at the factory. This number will always be "100" or greater, and applies only to the relay to which it was assigned. It should not be arbitrarily applied to any other relay type, where this same feature number may call for an entirely different modification.



MODIFICATIONS

section

COMMON FEATURE NUMBERS

- | | | |
|--|--|--|
| 1. * | 48. Plug-in terminals | 79. Two normally-closed auxiliary contacts on reversing contactor for electric interlock |
| 2. Molded armature block | 49. Hermetic Seal, Solder tabs | 80. Manual latch to hold armature closed |
| 3. High current (60 amp.) mercury contacts | 50. One resistor for 3-wire control | 81. Manual latch to hold armature open |
| 4. Nickel plating | 51. Two large resistors for 3-wire control | 82. Manual latch to hold armature half open |
| 5. Coil term. connected to one fixed contact | 52. Two small resistors for 3-wire control | 83. Manual button to close armature |
| 6. Blowout coils on all contacts | 53. Two resistors for 2-wire control | 84. Manual button to open armature |
| 7. N.O. auxiliary contact | 54. One resistor for 2-wire control | 85. Armature to close adjacent relay |
| 8. * | 55. Resistor & condenser for resonant circuit | 86. Armature to be closed by adjacent relay |
| 9. * | 56. Condenser for telephone ringing circuit | 87. Manual latch on housing-mounted relay with latch extending through cover |
| 10. Switchboard studs | 57. Two resistors for 2-wire control | 88. Anti-jackpot latch construction |
| 11. Front terminals on glass covered relay | 58. Resistor and N.C. cont. for coil inrush | 89. Manual button extending through cover of housing-mounted relay for opening armature |
| 12. Eyelet terminals | 59. Two resistors on 2-coil relay—one in series with each coil | 90. * |
| 13. * | 60. Polymerized coil | 91. * |
| 14. Solder tab terminals on relays where they are not standard | 61. Blowout coil on one front contact | 92. * |
| 15. * | 62. Blowout coil on two front contacts | 93. * |
| 16. Insulated switchboard studs | 63. Blowout coil on one back contact | 94. * |
| 17. * | 64. Blowout coil on two back contacts | 95. 50VA Reed Switch |
| 18. Disconnect blade terminals | 65. Old Style Blow Out coils on all contacts | 96. Δ Diode in parallel with coil. |
| 19. 100 amp. Mercury Tube | 66. Blowout coils on all except one front contact | 97. * |
| 20. Isolantite insulation | 67. Carbon to silver contact | 98. * |
| 21. Mycalex insulation | 68. Permanent magnet blow-outs on all but one front contact | 99. Silver contacts when not standard |
| 22. XXX bakelite insulation | 69. Permanent magnet blowouts on all contacts | |
| 23. Wide Spacing | 70. SP-DB-NO aux. cont. (HXX) | |
| 24. Yokes grounded to frame | 71. DP-SB-NO aux. cont. (BXX) | |
| 25. Metal Barrier or shield | 72. SP-DB-NO aux. cont. (MXX) | |
| 26. Non Metallic Barrier | 73. 1-NO & 1-NC aux. cont. (AXA) | |
| 27. XX Bakelite Base, Cross Bars | 74. 1-NO & 1-NC aux. cont. (HXH) | |
| 28. Insulated D.B. contact | 75. Two auxiliary contacts on two coil relays, to break both coil circuits | |
| 29. Sintered contacts | 76. One auxiliary contact to break top coil circuit of two coil relay | |
| 30. Tungsten contacts | 77. One auxiliary contact to break lower coil circuit of two coil relay | |
| 31. Carbon to Elkonite | 78. Two normally-open auxiliary contacts on reversing contactor for electric lock-up | |
| 32. Platinum contacts | | |
| 33. Split contacts | | |
| 34. Silver contacts with copper | | |
| 35. 1/4" dia. silver contacts | | |
| 36. 3/8" dia. silver contacts | | |
| 37. 1/2" dia. silver contacts | | |
| 38. 5/8" dia. silver contacts | | |
| 39. Mercury contacts | | |
| 40. Ferrous Parts Stainless Steel | | |
| 41. Cadmium plating | | |
| 42. Dull chrome plating | | |
| 43. Polished chrome plating | | |
| 44. Neon Light across coil | | |
| 45. * | | |
| 46. Continuous duty coils (latch relays) | | |
| 47. Table mounting (where not standard) | | |

*Number has not been assigned and is reserved for future use.

MISCELLANEOUS

- 02. Telephone ringing current
- 200. Heavy series coil
- 501. Telephone service, electrical reset
- 502. Universal latch relay with heavy contacts
- 600. One blowout coil and one resistor for flashing heavy lamp loads
- 610. Blowout coils and switchboard studs
- 611. Blowout coils and front terminals on glass covered relays
- 612. Blowout coils and eyelet terminals
- 700. One series coil and one shunt coil for emergency switching of flashing lamps



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TORONTO, ONT.

(Offices in Calgary, Alta. and
Montreal, Que.)

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PHILADELPHIA 2, PA., U.S.A.

PRICES of all relays and accessories in this Catalog are
contained in a separate price list available on request.

STRUTHERS-DUNN INCORPORATED, Pitman, New Jersey, U. S. A.